National Agricultural Higher Education Project- CAAST on

SKILL DEVELOPMENT TO USE SPATIAL DATA FOR NATURAL RESOURCES MANAGEMENT IN AGRICULTURE

1	**Name of the AU**	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur
2	**Date of establishment of the institute**	1964
3	**Mandate of the Institute**	• To serve as a centre of teaching in the field of agriculture and allied sciences. • To conduct basic, strategic, applied and anticipatory research in the field of agriculture and allied sciences. • To disseminate technology to farmers, extension personnel and organizations engaged in agricultural development through various extension programmes.
4	**Name of the present Vice-Chancellor**	Dr. Pradeep Kumar Bisen
5	**Postal Address,Telephone no, Fax and email**	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Adhartal, Jabalpur, (M.P.) 482 004 Tele. No.: 0761- 2681706, 2681809 Fax No.: 0761-2681389 Email Add: bisenvcjnkvv@gmail.com
6	**Name of the Nodal Officer with designation and address with telephone no and email**	Dr. R.K. Nema Designation: Dean, College of Agricultural Engineering, JNKVV, Jabalpur (M.P.) Telephone No.: 0761-2681118 Mobile No. 9407001170, 7999093788 Email: deancae@yahoo.com
7	**Number of constituents or on campus colleges and college-wise number of students**	The university encompasses Nine constituent colleges with total intake capacity of 1254 (743 Bachelor, 406 Master and 105 Doctorate). Number of students on roll is 3020 studying in Colleges of Agriculture located at Jabalpur (937), Rewa (416), Tikamgarh (334), Ganjbasoda (185), Waraseoni (190), Powakheda (190), and Khurai (140), College of Horticulture at Rehali (140), Chhindwara (63) and Agricultural Engineering at Jabalpur (425). Number of students admitted in Bachelor, Master and Doctorate degree programme

			Year wise number of students					Total
		Course	2014-15	2015-16	2016-17	2017-18	2018-19	
		Bachelor	B.Sc. (Ag)	142	246	282	468	550	1688
			B.Sc. (Forestry)	14	14	27	21	40	116
			B.Tech. (Ag. Engg.)	60	67	45	99	101	372
			Total	216	327	354	588	691	2176
		Master	M.Sc. (Ag)	142	246	282	201	383	1254
			M.B.A. (Agri.)	10	15	05	06	41	77
			M.Sc. (Forestry)	07	08	04	03	08	30
			M.Tech. (Ag.Engg)	25	25	37	23	19	129
			Total	184	294	328	233	451	1490
		Doctorate	Ph.D. (Ag/Ag.Engg)	26	28	35	51	127	267

8 **Number of college-wise faculty/scientists associated with teaching**

College of Agriculture Jabalpur has 103; Rewa 34; Tikamgarh 28; Ganjbasoda 40; Waraseoni 33; Powarkheda 43; Khurai 15; College of Horticulture Rehali 10; and College of Agricultural Engineering 20 faculty associated with teaching.

Programme wise / College wise Faculty Strength

SN	College	Program	No. of Faculty/ Scientist
1	College of Agriculture, Jabalpur	B.Sc. (Agriculture.) B.Sc. (Forestry) M.Sc. (Agriculture) M.Sc. (Forestry) MBA Ph.D.	103
2	College of Agriculture, Rewa	B.Sc. (Agriculture) M.Sc. (Agriculture)	34
3	College of Agriculture, Tikamgarh	B.Sc. (Agriculture) M.Sc. (Agriculture)	28
4	College of Agriculture, Gunjbasoda	B.Sc. (Agriculture)	40
5	College of Agriculture, Waraseoni	B.Sc. (Agriculture)	33
6	College of Agriculture, Powarkheda	B.Sc. (Agriculture)	43
7	College of Agriculture, Khurai	B.Sc. (Agriculture)	15
8	College of Agricultural Engineering, Jabalpur	B.Tech. (Ag. Engg) M.Tech. (Ag.Engg.) Ph.D.	20
9	College of Horticulture, Rehali	B.Sc. (Horticulture)	10

9	**Details achievement of the institute (Last five years) on the following items(Each item is having weightage)**	
	i) Research Achievements; Publication Record; Research publication with NAAS rating of more than 6.0; citation of publications; Awards at State/National/International Level	Total number of publications 1127 Total research papers with NAAS rating > 6 70 Citation of publication 3-40 Awards International - National • Sardar Patel Outstanding ICAR Institution Award – 2018. • University ranked at 9th place among 74 universities at national level. And others 18 State 3

RESEARCH ACHIVEMENTS DURING LAST FIVE YEARS (2013-2018)

- Total 28 varieties were released during last five years (5-wheat, 3- soybean, 3-chickpea, 5-rice, 3-linseed, 2-kodo, 2-Rice-bean, 2-oat, niger-1, 1-kutki and 1-sugarcane).
- Wheat variety MPO-1255 released and notified during 2015-16 is first product specific variety of the country having the highest protein content (13.8%), yellow pigments, vitamin A (6.51 ppm) with μ gliadin "45" highest iron (50.2) and Zinc (40.9). This variety has fulfilled all the international norms required for Pasta production and also fulfill norms for export as evaluated by IIWBR (ICAR)
- Wheat variety MP 3382 released during 2015 having high protein with good Chapati making quality under irrigated timely sown condition of MP.
- Soybean variety JS 20-69 is categorized as multiple resistant for biotic stresses like Yellow vein mosaic virus, charcoal rot, blight, Bacterial pustule, leaf spot and stem fly, stem borer and leaf defoliator, with high yield (20q/ha). This variety having excellent geriminability and longevity.
- The scented varieties i.e. improved Chinnor and Jeera Shankar were developed and released for exploitation of niche market of scented rice.

	• Recently released varieties JS 20-29, 20-34 and 20-69 are also becoming popular among the farmers of the state of Madhya Pradesh, Maharashtra and Rajasthan. JNKVV soybean varieties covers 90% soybean acreage in the country • Developed system of soybean, wheat, pigeon pea, and mustard intensification for enhancing the production and minimization of cost of production. • Identified potential cropping system and agro-forestry systems for different agro climatic zones for irrigated and rainfed situations for enhancing cropping intensity and sustainability. • Developed a protocol for commercial production of liquid biofertilizer which is more effective and efficient as compared to existing powder form of biofertilizers. • Developed electronic instruments such as Multi channel electronic choke indicator for tractor driven seed drills, Digital grain moisture meter, Fertilizer recommendation package, micro controller based rice polish measurement system, Soil nutrient estimation system, Micro controller based sulphur estimation system and personal computer based Monitoring system for safe grain storage. • Developed multimedia software for popularization of available agricultural technologies for various crops. • e-IPM multimedia bilingual (English/Hindi) software developed for pest, disease, nematode, weeds, and nutrient disorder management of major oilseed and pulse crops of central India. • Developed a new device Jawahar Guggul Blazer for sustainable tapping of Guggul. • During last five years the projects from external agencies were sanction for Rs. 8880.92 lakh. • Produced about 24 thousand quintals of breeder seed of various crops during 2016-17. The VV shares in national breeder seed production is about 18%. • Business planning and development unit organized about 25 entrepreneurship development programmes for various stakeholders of Madhya Pradesh, Maharashtra, Jharkhand and other states. • About 14 inter-institutional collaborative projects were operative in the VV.

- 19 MoUs with private sector, SAUs & National R&D institutions were signed by the JNKVV.
- Patents for Rice Polish Measurement System (Patent No. 228921) is granted to the scientists of the university for accurate measuring the rice polishing for maintaining the quality of rice.
- Many important meetings (52) and State/National level workshop have been organized during last five years. The important events are as follows::
    1. Regional workshop of Western region on Cost of Cultivation Scheme has been organized on 9th February 2012.
    2. A workshop on millets production was jointly organized by JNAU and Indian Council of Agricultural Research, New Delhi during May 3-5, 2013
    3. 18TH Annual Group Meet of All India Coordinated Research Project on Chickpea was organized during 24-26th August 2013.
    4. National Group Meeting (Rabi) of AICRP on Forage Crops have been organized during 7-8 Sept. 2013.
    5. National seminar on Technologies for sustainable production through climate resilient agriculture on 8th August 2014
    6. 53rd All India Wheat & Barley Workers meet and International Seminar for Enhancing wheat and barley production with special emphasis on Nutritional security has been organized on 22-25th August 2014.
    7. National Conference on Soil Health : A key to unlock and sustain production potential organized 3rd September 2014
    8. National seminar on "Weather and climate risks in agriculture under changing climate: Management and Mitigation" was organized on 12-13 March, 2015
    9. National workshop on Carbon sequestration in forest and non forest eco-system" has been organized on February 16-17, 2015.
    10. JNKVV. Research Council Meeting was organized on 21st May 2015.
    11. National conference on pulses " Challenges and opportunities under changing climate scenario held during 29th September – 1st October 2014
    12. Round Table workshop on Short and Medium Term Strategies for Agriculture. Development and its Adoption to Climate Change in MP (Jan 12-13th 2016)
    13. Strategies for area expansion of Pulses in Madhya Pradesh (28th Feb. 2016)

Details of Varieties developed in recent years

Recent Varieties developed

Rice :

Improved Chinnor

Average yield : 30-32 q/ha.

Crop duration : 155-160 days

Adaptation : Balaghat, Seoni districts of MP

Developed with all characters of traditional Chinnor. Useful in biodiversity conservation and making available quality seed material. A boon to the farmers by fetching more market prices. 25-30% more yield as compared to traditional Chinnor

IMPROVED JEERA-SHANKAR

Average yield : 30-32 q/ha.

Crop duration : 140-145 days

Adaptation : Seoni, Mandla, Dindori,

Anooppur Umaria, Shahdol and Katni districts (MP)

Developed with all characters of traditional Jeera-shankar. Useful in biodiversity conservation and availability of quality seed material. Provide more prices due to its improved characteristics which results in more income. More yield (25-30%) potential over traditional Jeera-shankar.

JAWAHAR RICE – 81 (JR – 81)

Average yield : 55-60 q/ha.

Crop duration : 115-120 days

Adaptation : Rainfed areas of Madhya Pradesh (wider adoptability)

JR-81 will replace the old/traditional varieties of rice viz. MTU 1010, IR-64 and IR-36. Grains long, fine with intermediate amylase content. 30-35% more yield over high yielding existing/traditional varieties. Fetch better market price.

VARIETY J.R. 767

Average yield : 37-45 q/ha.

Crop duration : 110 -115 days

Adaptation : Wider adoptability

Rice variety J.R. 767, which is released by JNKVV, College of Agriculture, Rewa is suitable for transplanting in irrigated condition. This is a high yielding, early maturing variety (110 -115 days to maturity) having scented, long slender grains along with erect and nitrogen responsive characters. This variety is resistant to rice diseases viz. Tungro and brown spot disease too. This variety is suitable for climatic conditions of Madhya Pradesh.

Oat Variety Jawahar Oat 04-315

(Jawahar Oat - 5)

Average yield : 575-600 q/ha green fodder.

Crop duration : 90-100 days

Adaptation : Central India

Jawahar Rice bean 2

A multi cut type and ready for harvest in 90-100 days i.e. 1st cut at 55-60 days and 2nd cut at 50% flowering. Possess high yield potential (575-600 q/ha green fodder) .Sustainable in low moisture conditions. Least susceptible to biotic stresses like leaf blight, Aphids/ tiller and leaf defoliator. Being a multi cut genotype it provides fodder for long duration. Suitable for oat growing areas of Central India.

Fodder Variety Jawahar rice bean 05- 4

(Jawahar rice bean -2)

Average yield : 260-270 q/ha green fodder.

Crop duration : 75-85 days

Adaptation : Pulse fodder growing areas

Possess high yield potential (260-270 q/ha green fodder). Sustain short duration of high moisture conditions. Least susceptible to biotic stresses like leaf blight, mosaic virus and leaf defoliator. An early genotype, it is suitable for cultivation in pulse fodder growing areas. Being semi erect growth habit, it is suitable for intercropping with Maize and Sorghum.

JAWAHAR GRAM 36

Average yield : 18-22 q/ha.

Crop duration : 105-115 days

Adaptation : Rainfed/irrigated areas

Jawahar Gram 36 is a desi chickpea high yielding variety (18-22 q/ha) with wider adaptability. It has semi-spreading growth habit, medium plant height, profuse branching. Its seeds are brown, medium in size and attractive. It is resistant to *Fusarium* wilt, moderately resistant to dry root rot and stunt. This variety is recommended for rainfed/irrigated areas.

NIGER- JNS-30

Average yield : 6 q/ha.

Crop duration : 97 days

Adaptation : Rainfed areas

JNS-30, a Niger variety takes 97 days for maturity with yield potential up to 6 q/ha. having 123 cm plant height. It can be grown from mid July to September end. It is found restraint to Cercospora and Alternaria leaf spot in field condition

LINSED - JLS 79

Average Yield : 17q/ha

Crop duration : 117-120 Days

Adaptation : Irrigated areas

Oil Content 36.8/5 %, moderately Resistant to wilt, Moderately Resistant to powdery mildew, rust: Resistant, Moderately Resistant to Bud fly.

Little millet (Kutki) RLM 4-1 (JK4)

Average Yield : 13 q/ha

Crop duration : 78-80 Days

Adaptation : Rainfed farming

Variety RLM 4-1 is erect and early maturing. It is suitable for sole as well as inter/mixed cropping. The variety is responsive to NPK application. The variety has good level of resistance against drought, lodging and to key pest shoot fly. The variety is moderately resistant to grain smut. Nutritionally RLM 4-1 is superior or at par with existing little millet varieties. Suitable for rainfed situation of Madhya Pradesh.

Publication Record (2013-2018)

Year	National Journal	International Journal	Book /book chapters	Technical Manuals/ bulletins	Tota
2013-14	139	27	-	-	166
2014-15	147	16	22	9	194
2015-16	195	32	18	-	245
2016-17	184	42	35	11	272
2017-18	170	64	15	1	250
Total	**835**	**181**	**90**	**21**	**112**

Research papers **published with NAAS rating 6.0 and above.**

S. No	Title of Research Paper	Author	*Name of Journal*	NAAS
1.	Remote Sensing and GIS based soil erosion assessment from an agricultural watershed.	Patil, R.J., Sharma, S.K. and Tignath, S. (2014).	*Arabian Jr Geosciences*. 8(9):6967-6984	6.86 (Citation-12)
2.	Use of remote sensing, GIS and C^{++} for soil erosion assessment in Shakker river basin.	Patil, R.J., Sharma, S.K., Tignath, S and Sharma, A.P.M (2017).	Hydrological Sciences Journal. 62(2), 217-231	8.06 (Citation-3)
3.	Trend analysis of rainfall time series for Sindh river basin in India.	Gajbhiye S, Meshram C, Mirabbasi R, **Sharma S K** (2016)	Theoretical and applied Climatology 125 (3-1), 593-608	8.32 (Citation-40)
4.	Use of fungicides for the management of *Alternaria* blight of Ashwagandha.	Dhananjay Kathal & Om Gupta	Environment and Ecology	7.26
5.	Heat unit requirement of wheat cultivars under varying thermal regimes at Jabalpur	Shambhu Prasad, K.K.Agrawal, Rakesh Kumar And Ved Prakash	Journal of Agro meteorology	6.4
6.	District wise wheat and rice yield predictions using meteorological variables in eastern Madhya Pradesh	A. K. Giri, M. Bhan and K.K. Agrawal	Journal of Agro meteorology	6.4
7.	Population ecology of soybean-rhizobia in diverse crop rotations in Central India	Vinod Kumar A.K.Rawata D.L.N.Raob	Agriculture, Ecosystems & Environment	10.1
8.	Effect of integrated nutrient management on soil fertility, organic carbon and productivity of okra	T.R. Sharma, S.B. Agrawal and N.K. Singh	Indian Journal of Horticulture	6.15
9.	Development of Memory based System Models for Rainfall- Runoff Process on Sequential Time Scale Basis	Sushil Kumar Pyasi, Neha Dwivedi	International Journal of Latest Transactions in Engineering and Science (IJLTES)	11.09
10.	Study on the socio-economic profile and knowledge level About	Alok Suryawanshi , M.K. Dubey ,	International Journal of Technical	10.2

	vermicompost technology among trainees	Manoher Saryam	Research & Science	
11.	Thermal requirements and heat use efficiency of Indian mustard varieties under different environment	P.K. Tyagi	Journal of Agro meteorology	6.4
12.	Evaluation and variability study in garlic	S.K. Prajapati, Akhilesh Tiwari and Sunil Prajapati	Indian Journal of Horticulture	6.15
13.	Field efficacy of plant growth promoting rhizobacteria isolates and their impact on crop growth, nutrient content and production of soybean in Vertisol	Amule, F. C; Rawat, A. K. ; Choudhary, B. K.; Sahu, R. K.	Environment and Ecology	7.26
14.	Optimization of paddy yield through different sowing techniques	Manorama Goutam; Tiwari , K. B.; Uma Pathak	Environment and Ecology	7.26
15.	Optimization of paddy yield through different sowing techniques	Manorama Goutam; Tiwari , K. B.; Uma Pathak	Environment and Ecology	7.26
16.	Field efficacy of plant growth promoting rhizobacteria isolates and their impact on crop growth, nutrient content and production of soybean in Vertisol	Amule, F. C.; Rawat, A. K.; Choudhary, B. K.; Sahu, R. K.	Environment and Ecology	7.26
17.	Techniques for screening of chickpea genotypes against collar rot, its management through host plant resistance and fungicides.	Amule, Ramesh, Om Gupta and Madhuri Mishra (2014)	Legume Res. (An International Journal) 37(1): 110-114	6.15
18.	Molecular characterization and comparative phylogenetic analysis of phytases from fungi with their prospective applications.	Gontia-Mishra I. and Tiwari, S. (2013).	Food Technology and Biotechnology, 51(3):313-326.	7.18
19.	Isolation, morphological and molecular characterization of phytate hydrolysing fungi by 18S DNA sequence analysis.	Gontia-Mishra I., Deshmukh, D., Tripathi, N., Bardiya-Bhurat, K., Tantwai K.	Brazilian Journal of Microbiology, 44(1):317-323.	6.87

		and Tiwari, S. (2013).		
20.	Computational identification, homology modelling and docking analysis of phytase protein from *Fusarium oxysporum*..	Gontia-Mishra, I., Sasidharan S. and Tiwari S. (2014).	Biologia, 69(10):1283-1294	6.72
21.	Recent developments in use of 1-aminocyclopropane-1-carboxylate (ACC) deaminase for conferring tolerance to biotic and abiotic stress.	Gontia-Mishra, I., Singh, V.K., Tripathi, N., Sasidharan S. and Tiwari S. (2014).	Biotechnology Letters, 36(5):889–898.	7.64
22.	A simple and rapid DNA extraction protocol for filamentous fungi efficient for molecular studies.	Gontia-Mishra, I., Tripathi, N., and Tiwari S. (2014).	Indian Journal of Biotechnology, 13:536-539.	6.29
23.	Polymorphism analysis in advanced mutant population of oat (*Avena sativa* L.) using ISSR markers.	Sharma, P., Tiwari S., Tripathi, N. and Mehta, A.K. (2016).	Physiology and Molecular Biology of Plants. 22(1):115-120.	7.35
24.	Alleviation of mercury toxicity in wheat by the interaction of mercury tolerant plant growth promoting rhizobacteria.	Gontia-Mishra, I., Sapre, S., Sharma A. and Tiwari S. (2016).	Journal of Plant Growth Regulation, 35:1000-1012	8.17
25.	Amelioration of drought tolerance in wheat by the interaction of plant growth promoting rhizobacteria.	Gontia-Mishra, I., Sapre, S., Sharma A. and Tiwari S. (2016).	Plant Biology, 18(16):992-1000.	8.22
26.	Molecular diversity of 1-aminocyclopropane-1-carboxylate (ACC) deaminase producing PGPR from wheat (*Triticum aestivum* L.) rhizosphere.	Gontia-Mishra, I., Sapre, S., Kachare, S. and Tiwari S. (2016).	Plant and Soil, DOI: 10.1007/s11104-016-3119-3.	8.97
27.	Regeneration of plantets from immature explant culture in *Glycine Max* (L.) Merrill.	Pathak, N., Tiwari S. and Mishra M.K. (2017)	Legume Research 40(1): 69-73	6.15
28.	Chemical Speciation of Zinc and their Availability to Wheat in a TypicHaplusterts as Influenced by Zinc Fertilization.	Keram K.S., Sharma B.L., and Sharma G.D. (2015).	*Vegetos* 28(4): 137-145.	6.04

29.	Status of Micronutrients in Mixed Red and Black Soils of Rewa District of Madhya Pradesh, India.	Sharma Y.M., Jatav, R.C., Sharma, G.D. and Thakur Risikesh (2013).	*Asian Journal of Chemistry*, 25 (6): 3109-3112.	6.25
30.	Genetic architecture of quantitative traits in barley *(Hordeum vulgare* L.).	Raikwar Rudrasen Singh, Upadhyay A. K., Gautam U. S. and Singh V. K. (2014).	*Indian Journal of Genetics and Plant Breeding*. Vol. 74 (1): 93-97.	6.19
31.	Assessing carbon and nitrogen partition in *Kharif* crops for their carbon sequestration potential.	Kushwah, S. K., Dotaniya, M. L., Upadhyay, A. K., Rajendiran, S., Coumar, M. V. Kundu, S. and Rao, A. Subba (2014).	*National Academy Science Letters*. Vol.37 (3): 213-217.	6.20
32.	Maize area and production forecasting in eastern region of Madhya Pradesh: An application of Box-Jenkins ARIMA model,	Ogunleke, A. O. and Nahatkar, S.B. (2015).	*Journal of Recent Advances in Agriculture*, 3(3):361-376.	6.898
33.	Influence of organic & inorganic source of nutrients on physic-chemical properties of soil under high density mango orchard *(Mangifera indica* L.) Cv. Amrapli.	Sharma Rajnee, Jain, P.K., Sharma, B. L., Pandey, S. K. (2014)	Indian J. of Horticulture 48 (3):279-282	6.13
34.	Directional effect of malformation incidence of different mango *(Mangifera indica* L.) cultivar Amravati	Tiwari Poorti, Soni Nitin, Shrivastava, A. and Pandey, S. K. (2014).	International J. of Agricultural Statistics Science Vol. 10 pp. 282-287	6.00
35.	Life testing using probability distributions.	Mishra,Pradeep, Singh,R.B. and Sharma,H.L. (2013):	Int.J. Agricult.Stat.Sci.9(2),699-707	6.00
36.	Achievements and prospects of genomics-assisted breeding in three legume crops of the semi-arid tropics.	Varshney, R. K. Tripathi , S. Datta N. Mallikarjuna , G. Anuradha , Anita Babbar , A. K. Choudhary, M.B. Mhase,	Biotechnology Advances. 31:1120-1134.	15.85

		C.L.L. Gowda. (2013).		
37.	Rising atmospheric CO2 may affect oil quality and seed yield of sunflower (*Helianthus annus* L.).	Pal Madan, Chaturvedi K Ashish. , Pandey, Sunil K.Bahuguna, Rajiv N.,Khetarpal, Sangeeta, Anand, A. (2014).	Acta Physiologiae Plantarum. 11738-014-1651-4.	7.56
38.	Molecular approaches for genetic improvement of seed quality and characterization of genetic diversity in soybean.	Tripathi N and Khare D. (2016)	A Critical Review Biotechnol Lett 38 (7):1645-1654.	6.99
39.	Low seed rate at surface sowing enhance resilience of physiological parameters and economics of wheat (*Triticum aestivaum*)	Singh Harvir, Jha Girish, Rawat Anay, Babu Subhash and Jha A. K. 2013.	*Indian Journal of Agricultural Sciences* 83 (8): 881–4	6.18
40.	Effect of weed control practices on the fodder and seed productivity of Berseem under irrigated condition of Madhya Pradesh.	Jha A K. Shrivastva Arti, Raguvanshi , N. S. 2014.	*Range management & Agro forestry*	6.39
41.	Evaluation of CHIKPGRO model in semi arid and sub-humid climatic conditions of Madhya Pradesh.	Sandip Silawat, A. K. Srivastava and K. K. Agrawal (2016).	MAUSA, 67,: 599-608	6.18
42.	Simulating the impact of climate change on chickpea yield under rainfed and irrigated condition in Madhya Pradesh.	A.K. Srivastava Sandip Silawat, and K. K Agrawal (2016).	J. of Ago meteorology 18(1): 100-105	6.15
43.	Simulation of chickpea yield and yield attributes in Central India"	Sandip Silawat, A.K. Srivastava and K.K. Agrawal.	(special issue of the Journal of Agro meteorology	6.15
44.	Trends and variability in evapotranspiration at Jabalpur Madhya Pradesh.	Chakravarty, R., Bhan,M., RAO Kesava, A.V.R., Awasthi M. K. (2015)	Journal of Agro metrology 17(2): 199-203,	6.01
45.	Tractor drawn Raised bed seed drill under vertisol.	Atul K. Shrivastava,	Agricultural Mechanization	6.10

			Alok Dubey & R.K. Dubey (2012).	in Asia, Africa and Latin America (AMA). Vol. 43-(4): 16-20	
	46.	Design, development and Evaluation of self propelled garlic (*Allium sativum*) clove planter.	Brijesh Nare & Atul Shrivastava (2014)	Agricultural Mechanization in Asia, Africa and Latin America (AMA),Vol. 45 (2): 74-79	6.10
	47.	Thermal kinetics of colour degradation of yellow sweet pepper (*Capsicum annum* L.) undergoing microwave assisted convective drying.	Swain, S., Samuel, D.V.K., Bal, L.M. & Kar, A.(2014)	*International Journal of Food Properties*, 17(9), 1946-1964.	IF:0.906,
	48.	A decision support system for Farm Mechanization with the use of computer modelling for soybean-wheat crop rotation.	Abhay Kumar Sinha and Atul Kumar Shrivastava (2016)	International Journal of Innovative Science, Engineering & Technology, Vol.3 issue 7, July 2016	8.10
	49.	Hydraulic jump over sloping rough floors.	Mohit Kumar and A.S. Lodhi (2015).	Journal of Hydraulic Engineering: 1-8 .	6.158
	50.	Effect of perforation mediated MAP on shelf life of mushroom (*Volvarie llavolvacea*).189,	Dhalsamant, K., Dash, S.K., Bal, L.M. & Panda, M.K. (2015).	Scientia Horticulturae,	IF:1.504
	51.	Bamboo shoots: A novel source of nutrition and medicine.	Singhal, P., Bal, L.M., Satya, S., Sudhakar, P. & Naik, S.N. (2013).	Critical Reviews in Food Science & Nutrition 53(5), 517-534.	IF:5.548,
	52.	Modelling the microwave assisted drying process of osmotically pre-treated red sweet pepper (*Capsicum annum* L.).	Swain, S., Samuel, D.V.K., Bal, L.M., Kar, A. & Sahoo, G.P. (2012).	Food Science & Biotechnology, 21(4), 969-978.	IF:0.656,
	53.	Bamboo shoot preservation for enhancing its business potential and local economy (a review).	Bal, L.M., Singhal, P., Satya, S., Naik, S.N. & Kar, A. (2012).	Critical Reviews in Food Science & Nutrition, 52, 804-814.	IF:5.548

54.	Influence of cohesion on scour around submerged dike founded in clay–sand–gravel mixtures.*ISH*	Lodhi A. S., Jain R.K. and Sharma P.K. (2016).	Journal of Hydraulic Engineering, 22 (1): 70-87.	IF: 0.158
55.	Effect of fine sediments on river hydraulics – a research review.	Karna N., Hari Prashad K. S., Giri S. and Lodhi A. S. (2015).	ISH Journal of Hydraulic Engineering, 21 (2): 151-161.	IF: 0.158
56.	Intrusion of fine sediments into river bed and its effect on river environment – a research review.	Karna N., Hari Prashad K. S., Giri S. and Lodhi A. S. (2015).	ISH Journal of Hydraulic Engineering, 21 (2): 142-150.	IF: 0.158
57.	*Klebsiella sp*. confers enhanced tolerance to salinity and plant growth promotion in oat seedlings (*Avena sativa*)	Swapnil Sapreiti Gontia-Mishra Sharad Tiwari	Microbiological Research	9.04
58.	A Series of Nested Two, Three Designs and Group Divisible Designs using Hadamard Matrices	Roshni Tiwari , H.L. Sharma and S.S. Gautam	International Journal of Mathematics Trends and Technology (IJMTT)	8.53
59.	Development of Mathematical Model for Repair and Maintenance of Some of the Farm Tractors of JNKVV, Jabalpur, India	Avinash Kumar Gautam and Shrivastava AK	Advances in Crop Science and Technology	7.55
60.	Study on the socio-economic profile and knowledge level about vermicompost technology among trainees	Alok Suryawanshi ,M.K. Dubey, Manoher Saryam	International Journal of Technical Research & Science	7.425
61.	District wise wheat and rice yield predictions using meteorological variables in eastern Madhya Pradesh	A. K. Giri, M. Bhan And K.K. Agrawal	Journal of Agro meteorology	6.4
62.	Development of Memory based System Models for Rainfall- Runoff Process on Sequential Time Scale Basis	Sushil Kumar Pyasi, Neha Dwivedi	International Journal of Latest Transactions in Engineering and Science (IJLTES)	11.095

63.	Assessment of runoff and sediment outflow at different land slopes with varying rainfall intensity storms under simulated condition	Nema Sourabh, Kumar Akhilesh , Sinha Jitendra	Journal of Soil and Water Conservation	8.23
64.	In vitro evaluation for compatibility of additives with *Beauveria bassiana* (Balsamo) Vuillemin	P. Swathi, P. N. Ganga Visalakshy	Egyptian Journal of Biological Pest Control	6.18
65.	Physical Performance in Irrigation Minors Area under Different WUAs	D. Chouhan, R. K. Nema , and K. S. Kushwaha	Journal of Agricultural Science And Technology	6.89
66.	Studies on the effect of day time application of herbicide mesosul furonmethyl on soil microbial communities of wheat rhizosphere	A. Singh, M.L. Kewat and S. Sondhia	Journal of Environmental Biology	6.7
67.	Assessment of yield and economic losses in agriculture due to weeds in India	Yogita Ghardea P.K.Singha R.P.Dubey P.K.Gupta	Crop Protection	7.83
68.	Physical Performance in Irrigation Minors Area under Different WUAs	D. Chouhan, R. K. Nema , and K. S. Kushwaha	Journal of Agricultural Science and Technology	6.81
69.	Past two decadal ground water level studies in Tikamgarh district of Madhya Pradesh	Patle, D and Awasthi, M.K. (2019)	Journal of Geological Society of India	6.30
70.	Effect of irrigation sources on yield of wheat crop in selected command area of Rani Awanthi Bai Sagar Irrigation Project	Mishra, C.D., Tiwari, Y.K., Nema R,K, and Nema A.K. (2018)	Journal of Agro meteorology	6.40

Awards/ Recognition, National and International

- Krishi Bhushan Award 2013 (Dr. S.B. Nahatkar) Asian consortium of Farmers Producer Company (ACFPCL) & Integrated Socio-Economic Services (ISED).
- Sardar Patel Outstanding ICAR Institution Award – 2018.
- University ranked at 9th place among 74 universities at national level.

	• National Best Agricultural University Award for Education by Mahindra Samriddhi India Agri Award in 2015. • Best Agricultural University Vice Chancellor Award by AIASA in 2015. • Life Time Achievement Award by GBPUA and T, Pantnagar to Dr. V.S. Tomar, Vice Chancellor, in 2015. • Bioved Young Scientist Award (Dr. H.K. Rai), 15th Indian Agricultural Scientist and Farmers Congress organized by Bioved Research Institute of Agriculture and Technology at University of Allahabad during 24th February, 2013. • Best AICRP Centre Award (2013), PC, Unit Indian Grassland and Fodder Research Institute, Jhansi. • Best All India Coordinated Forage Improvement Project Research Centre (2013), ICAR-For development of varieties of forage crops. • Young Scientist Award 2014 (Dr. A.K. Jha), Rang Management Society of India, Jhansi. • Young Women Scientist Award 2014 (Dr. Suneeta Pandey) Association for the advancement of Biodiversity science, Mysore, Karnataka. • Excellent Breeder Seed Production Unit Award National Seed Project (2015) ICAR-Zonal Award for KVK activities. • "Bioved Young Scientist Award" for outstanding contribution made in the fields of "Agriculture" 2015 (Dr. Stuti Mishra) 17th Indian Agricultural Scientists and Farmers' Congress on "Agri-Innovation for Enhancing Production & Rural Employment organized at Bioved Research Institute of Agriculture & Technology, Allahabad U.P. • MAHIMA Fellow Associate Award 2015-16 (Dr. H.K. Rai) National Seminar on Climate Change by Mahima Foundation Near BHU, Varanasi (U.P.) during 13th November, 2015. • Bioved Fellowship Award 2015" (Dr. S.K. Pandey) Bioved Research Institute of Agriculture on the occasion of 17th Indian Agricultural Scientist and Farmers Congress 21-22 Feb 2015 at Allahabad. • Life Time Achievement Award 2016 (Dr. Om Gupta) National conference on innovative and current advance in Agriculture and Allied Sciences (ICAAAS-2016) by the society for Scientific Development in Agriculture Technology during

20-11 Dec, 2016 at Prof. Jayshanker Telangana State Agricultural University, Rajandra Nagar, Hyderabad.

- Harit Ratna Award 2016 (Dr. Om Gupta) 2nd National Youth Convention on Agricultural Innovations in Sustainable Food Systems of Improving Rural Livelihood: AIASA, ICAR and University of Agricultural Sciences Raichur. Karnataka for Outstanding Contribution on Empowerment of Youth & Betterment of Agricos.
- Young Scientist Award 2016 (Dr. Vijay Agrawal) National conference on "Innovative and current advances (ICAAAS-2016) held on 10-11 December, 2016 at Prof. Jayashankar Telangana State Agricultural University, Rajendra Nagar, Hyderabad (Telangana).

State

- Appreciation Award for Contribution in Krishi Karman Award by Government of India in 2016.
- Appreciation Award for Contribution in Krishi Karman Award by GoI in 2017.
- Best Scientist Associate Award 2015 (Dr. Stuti Mishra) National Conference on Global Research Initiatives for Sustainable Agriculture & Allied Sciences (GRISAAS) at RVSKVV, Gwalior (M.P.).

ii) Technology commercialization & Transfer to private sector/National/International organizations; Patents obtained; consultancy provided with money earned	Jawahar Rice Hybrids JRH 5 and JRH 8 to 10 agencies Jawahar Bio-fertilizers Intern. Biotech Products, Ratlam • Azotobacter *Azotobacter chroococcum* • Azospirillum *Azospirillum lipoferum* • PSB *Bacillus megaterium* • Rhizobium *Rhizobium leguminosarum* • **No. of Products tested 679 Receipt RS 814 lakh** • Patents obtained 2 Patent applied 6

- **Technology commercialization & Transferred to private sector/ National/International organizations**

Details of Technology commercialization by the Institute

The institutes have commercialized the hybrids of rice and strains of bio-fertilizers on non-exclusive basis. The details of commercialized technologies given below:

Technology	Commercialization	Agencies to wh commercialized
Jawahar Rice Hybrids	JRH 5 and JRH 8	Vibha Agrotech Ltd. Nuziveedu Seeds Super Agri Seeds Pvt. Ltd. Dantiwara Seeds Pvt. Ltd. DeltAgri Genetics Pvt. Ltd. Manisha Agritech Pvt. Ltd Ajeet Seeds DCM Shriram Consolida Ltd. TriMurti Plant Sciences Ltd. Bayer Crop Science
Jawahar Bio-fertilizers	• Azotobacter *Azotobacter chroococcum* • Azospirillum *Azospirillum lipoferum* • PSB *Bacillus megaterium* • Rhizobium *Rhizobium leguminosarum*	

Technology developed and disseminated at large scale

Rice

- Witnessed rice revolution through development of early hybrid rice varieties JRH 4, JRH 5, JRH 8 and JRH 19. This has resulted to utilize rice fallow through cultivation of chickpea in upland rice growing area specially in eastern part of the Madhya Pradesh.

	• Scented varieties i.e. improved Chinnor and Jeera Shankar were developed and released for exploitation of niche market of scented rice. **Soybean** • Developed the world famous Jawahar Soybean series of soybean varieties with better oil (18-20%) and protein (40-42%) content with resistance to major diseases, which laid strong foundation for expansion of its area and production in the country. • JS 93-05 released in 2002, JS 95-60 released in 2007, JS 97-52 a multiple resistant, high yielding cultivar, released in 2008 are become very popular among the farmers These all Soybean varieties have help in breaking mono-culturing of JS 335 which is presently become susceptible to many biotic stresses. • JNKVV soybean varieties cover 85% soybean acreage in the country. • Recently released varieties JS 20-29, 20-34 and 20-69 are also becoming popular among the farmers of the state of Madhya Pradesh, Maharashtra and Rajasthan. **Chickpea** • JG 11 brought the chickpea revolution in southern states particularly Andhra Pradesh and Karnataka. • JG 74, JG 130, JAKI 9218, JG 16, JG 63, JG 36 have made diversification in different part of the state. • JG 14 as first world heat tolerant variety has been released. • Introduction of Kabuli chickpea varieties (JGK-1) led to expansion of 15% area under bold seeded chickpea in the State. **Wheat** • M.P. Wheat is known for its quality. Numerous high quality wheat varieties have been developed in past. • Developed better quality and product specific varieties i.e., JW 3020, JW 3211 and JW 1203 (new), JW 1201, JW 3269, MP 3382, MP 1255 which are suited to different agro-climatic conditions and management practices. • Due to preferred quality of wheat produced in Madhya Pradesh the GI status is likely to be declared for MP quality wheat.

Small Millets

- Developed high yielding small millet varieties of Kodo (7 varieties), ragi and kutki (2 varieties each) during last fifteen years for food security in tribal areas of the state and now a day's these crops are popular as exotic food by the elite classes.

Vegetables

- Developed improved varieties of vegetables such as chillies (2 varieties), table and field pea (5 varieties), sweet potato (2 varieties), brinjal (2 varieties), tomato (1 variety) and Indian bean (4 varieties).

Medicinal Plants

- Developed high yielding varieties of medicinal and aromatic plants such as opium poppy (2 varieties), Ashwagandha (2 varieties), Isabgol (1 variety) and Safed musli (1 variety).

Disease resistant

- Significant contribution towards approaches for sustainability through the development of crop varieties resistant to diseases such as YMV of soybean (JS 97-52), white rust (Jawahar Mustard-1), downy mildew (Jawahar Bajra Hy.1), wilt (Jawahar Gram-218), powdery mildew (Jawahar Moong-721), wilt and sterility mosaic (Pigeonpea JKM-7) Phytophthora blight (Jawahar Til-22), powdery mildew and wilt (Jawahar Pea-885), fruit rot (Jawahar Mirch-218) and scurf (Jawahar Sweet potato 145).

Management Practices

- Developed management practices for black soils of high rainfall areas such as (a) Ridge furrow system for planting of upland crops, (b) Raised and sunken bed technologies and (c) rainwater recycling technology for efficient use of land and water resources.
- Developed and validated system of soybean, wheat, pigeonpea, and mustard intensification for enhancing the production and minimization of cost of production.
- Identified potential cropping system and agro-forestry systems for different agro climatic zones for irrigated and rainfed situations for enhancing cropping intensity and sustainability.

	• Evolved production technology for 30 medicinal and 6 aromatic plants. Quality analysis lab supports the value addition in this sector. • Promoted ridge and furrow system of soybean planting which enhanced the productivity of soybean under excessive rainfall condition as well as under water stress condition. • Promotion of System of Rice Intensification which enhanced the profitability from rice due to enhanced productivity and optimization of resource use. • For promotion of integrated farming systems, the VV has developed production technology for lac production, beekeeping, mushroom production, inland fisheries, poultry, vegetable production, small food processing units etc • Developed technologies for soil conservation, ground water recharge, low water lifts, water, mapping of irrigation & energy saving in irrigation • For improvement of water productivity the Water Resources Restructuring project was implemented in five river basins covering 25 districts of Madhya Pradesh. The results are encouraging and farmers are adopting the demonstrated technologies for increasing water productivity. • Developed soils test based fertilizer adjustment equations for 16 major crops of the State for achieving desired yield targets. • Developed packages for economic and efficient use of fertilizers, manure and bio-fertilizers for different crops. • Developed a protocol for commercial production of liquid bio fertilizer which is more effective and efficient as compared to existing powder form of bio fertilizers. • Developed technology for High tech horticulture and successfully produced colored capsicum, Jerbera, bud roses, cherry tomatoes and cucumbers. • Developed Jawahar Light trap for monitoring of Insect-pest occurrence. • Integrated Pest Management package for the management of major insect pest diseases have been developed. • Package for cultivation of betel vine with efficient and economical management of phytophthora blight diseases has been developed and popularized. • Developed low cost technology for cultivation of oyster mushroom.

Machines

- Developed low cost machinery viz. Thresher for sunflower, Safflower handling devices, Water chestnut decorticator, Pea peeling machine, Chickpea stripping cum shelling machine, Tillage equipment, Energy saving dryers and Onion storage structure.
- Developed electronic instruments such as Multi channel electronic choke indicator for tractor driven seed drills, Digital grain moisture meter, Fertilizer recommendation package, micro controller based rice polish measurement system, Soil nutrient estimation system, Micro controller based sulphur estimation system and personal computer based Monitoring system for safe grain storage.

Software

- Developed multimedia software for popularization of available agricultural technologies for various crops.
- e-IPM multimedia bilingual (English/Hindi) software developed for pest, disease, nematode, weeds, and nutrient disorder management of major oilseed and pulse crops of central India.

Product Testing: The University performing testing of product developed by the Industries

Year	2015-16	2016-17	2017-18	2018-19	2019-20 (as on 15.12.2019)	Total
No. of Products tested	110	148	161	198	65	**679**

(Details of Product testing trials conducted under CPC for five years)

S. No	Year	No. of trials conducted (Rabi and Kharif)	Amount received as testi fee in Rs
1.	2015-16	110	15838
2.	2016-17	148	225270
3.	2017-18	161	168000
4.	2018-19	198	295590
5.	2019-20	57 (as on 15.12.2019)	109740
	Total	**674**	**814438**

Other Revenue Generated 2019

Sale of inputs	374.90 lakh
BSP unit seeds	376.39 lakh

Patents obtained

Two patents were granted to scientists of JNKVV. The details are as follows:

- Improved Seed Drill Choke Indicator (Associated scientists, (A.K. Rai, S.N. Murthy) – 232368
- Rice Polish Measurement System (Bharti Das, S.K. Jain & S.N. Murthy) - 228921

Patents filed

- DNA Barcode for species identification of sedge plants (K.Tantwai, S. Tiwari and N. Tripathi) - 201721001636 dated: 16-01-2017.
- A cost effective method for genotype identification based on simple sequence repeats marker data (Sharad Tiwari and Niraj Tripathi) - 201721006312 dated 10-03-2017.
- A Laser based Perpendicular marker Device for layout of an agricultural Field (Neelam Sahu and Dr. N.K. Khandelwal) - 201821039036 dated 15-10-2018.
- A new chloroplast based primer set to discriminate three closely related species of genus Mentha through DNA bar-coding coupled high resolution melting analysis and method thereof (Dr. Sharad Tiwari, Dr. Vishwa Vijay Thakur and Dr. Niraj Tripathi) -201821011098 dated 27-04-2018.
- Expression and storage of database on fingerprint by coloured barcode for varietal verification and method thereof (Dr. Niraj Tripathi, Dr. Dhirendra Khare, Dr. Bharti Das and Dr. Moni Thomas) - 201821043167 dated 07-12-2018.

Composition of Guggul Fortified Laddu (Dr. Niraj Tripathi, Dr. Moni Thomas, Dr. V.K. Pyasi and Dr. Dhirendra Khare) - 201821031051 A dated 31-08-2018

iii)	Teaching quality standard and faculty strength; Best Teacher Awards AU/ICAR/ National Level; Number of JRF and SRF selected; Students selected in ARS;	Audio-Visual aids for Smart e-Classroom Video Conferencing System: Distance Learning Hostel and Sports facilities Establishment of Grievances Redressal Cell Access to University Knowledge Bank Advancement in e-Governance

		Number of students who were admitted in foreign universities; Upper 5% percentile in GATE	Model Class Room Involvement of students entrepreneurship Institutional Repository (Krishi Kosh) Library Automation Students passed during last 5 years JRF 35 SRF 21 GATE 66 ARS 14 Number of students admitted in foreign universities 03

Teaching quality standard and faculty strength

Adoption of recommendations of fifth dean's committee since 2016-17

	a) Physical facility for good teaching and learning	**Audio-Visual aids for Smart e-Classroom** • E-learning adopted in Vishwa Vidyalaya comprises all forms of electronically supported learning. The information and communication system, weather network learning or not serve as specific media to implement the learning processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. **Video Conferencing System: Distance Learning** • Multi-point Video Conferencing facility is available at JNKVV Headquarter, i.e. at Jabalpur connecting to Single-point Video Conferencing System at outlying campus i.e. Rewa, Tikamgarh, Ganjbasoda. **Hostel and Sports facilities** • The University has separate undergraduate and postgraduate hostels for boys and girls. The students live in a pleasant and intellectually stimulating environment with people having similar goals. • International hostel in JNKVV, Jabalpur is constructed with the support of ICAR. For facilitating students, gymnasium, stadium, swimming pool, etc. are provided to minimize intellectual isolation. • Each college has health centre supported by medical and paramedical staff. **Establishment of Grievances Redressal Cell** • The cell and coordination units are established at College and University level of which information is available on official website of the University. **Access to University Knowledge Bank** • Apart from the facilities available in each department, section and college, the office of the Dean Student Welfare provides the advisory services to the boys and girls students for the effective utilizations of ARIS (Agriculture Research Information System), KOHA

				automation services, OPAC (Online Public Access Catalog), Krishikosh, CeRA (Consortium for e-Resources in Agriculture. **Advancement in e-Governance** • University has adopted the policy of transparency (POT) and with the help of Unified Web Portal System (UWPS) where all the colleges and student level activities are displayed. The major activities covered under e-Governance for the benefit of students include online display of results, fee deposition, status of scholarship through Examination and result Processing System (ERPS), PDC, Job interview etc.	
			b) Modern Class Room developed	**Model Class Room details** - Interactive e-board, Computer, Audio Visual System, Wifi Internet connectivity are provided at • College of Agriculture, Jabalpur - 4 • College of Agricultural Engineering, Jabalpur -3 • College of Agriculture, Rewa - 3 • College of Agriculture, Gunjbasoda - 3 • College of Agriculture, Tikamgarh - 3 • College of Agriculture, Waraseoni - 3 • Directorate of Extension Services - 1 • Directorate of Research Services - 1	
			c) Industry/Corporate led employability	**Involvement of students entrepreneurship** • Several Experiential Learning Programme (ELPs) are continued in horticulture, food science, post harvest, engineering, bio pesticide and seed production. These programs provide a better base for start-up among students and build a confidence for entrepreneurship.	
			d) IT enabled training acquired and faculty and student upgraded	All the teachers have been trained to use IT based instrumentation and courses of computer application are running as subject in the degree program for the students.	
			e) Digitization of Library	**Institutional Repository (Krishikosh)** • Central Library maintain institutional repository on Krishikosh platform and for the Year 1992 to 2016 all 4570 thesis are uploaded in Institutional Repository.	

		Library Automation • Central Library is installed and implemented KOHA Library automation software for smooth functioning of the library. Total 78600 records are entered in KOHA platform.

Students Performance in different examinations

Examination/ Parameter	Year wise number of students					Total
	2014-15	2015-16	2016-17	2017-18	2018-19	
JRF	05	02	01	04	23	**35**
SRF	00	00	00	18	03	**21**
ARS	00	02	00	12	00	**14**
Upper 5% percentile in GATE	08	14	13	19	12	**66**
Number of students who were admitted in foreign universities	01	00	00	02	00	**03**

iv)	Student placement records and awards bagged by students e.g., National Young Scientist Award, ICAR's Jawaharlal Nehru thesis Award, Awards at Agri-Unifest, Agri-Uni sports meet ,etc.	**Students selected in State and Central Government Jobs over last five years 600** Educational institutes 101 State Departments of Farmers Welfare and Agriculture Development 157 ATMA 57 State Seed Corporation/FCI 105 Seed Certification Agency 64 Forest Department 43 Directorate of Agricultural Engineering Govt. of M.P. 09 State Police 24 Banks 36 Revenue Department 04 **Awards in All India Sports and Youth Festival 14** **Details presented in Annexure – I**
v)	PG Programme Accredited	Agriculture Faculty M.Sc. (Ag) and Ph.D. in Agronomy, Agriculture Economics and Farm Management, Crop Physiology, Entomology, Extension Education, Horticulture, Plant Breeding, Plant Pathology, Soil Science, Biotechnology M.Sc. in Forestry, PhD in Agro Forestry

		Agricultural Engineering Faculty M. Tech. and Ph.D. in Farm Machinery and Power Engineering, Post Harvest and Process Engineering and Soil and Water Engineering
	vi) Excellence achieved in the area of the proposed centre; Impact of the work done in quantifiable terms, Technologies that have reached to farmers on large scale	• Established a RS and GIS lab with software and hard ware • Education to UG PG and Ph.D. on RS and GIS applications in Agriculture • Successfully completed NATP CGP project (2000-2003) on Natural Resource Development using RS and GIS, and assessed Agricultural drought and selected sites for water harvesting structures in rain fed areas of Niwas tehsil of Mandla district. • Land use/ land cover and crop maps were prepared (2005-2015) for Tons basin with 12.5 lakh ha and Sindh basin covering 27.5 lakh ha using satellite data on GIS platform under World Bank funded Madhya Pradesh Water Sector Restructuring project. • 78 Agricultural Thematic maps on Soil, Water body and Geomorphic attribute were prepared for WRDM MP (2011-2014) under World Bank Project. • Watershed characterization and prioritization was extensively studied involving RS & GIS application, principal component analysis and hypsometric analysis with command area monitoring under different conditions including ground potential zoning in Tawa command of Hosangabad district and RASIP Bargi command in Jabalpur and Narsingpur districts. • Trained to 1250 officials of sate agriculture and horticulture departments for improving water productivity which indirectly benefited about one lakh farmers for improvement in agriculture. • Conducted 196 training for 9198 Farmers of Water User Association at 18 locations in MP on different topics for improving Water Productivity. • Total 35 dissertations of M. Tech. and Ph.D. students completed successfully. • Published 61 research papers and 6 Technical bulletins out of the studies conducted. **Details given in Annexure -IX**
	vii) Linkages developed with National and International	The University has established good linkages for higher education, research and training with the following major institutions.

	organization/Universities and how effective these have been in quantifiable terms	**International institutions**
		• **Japan International Cooperation Agency-JICA**
		• Alcorn State University, Alcorn State, Mississippi
		• United State of America School of Agricultural and Environmental Sciences, ALABAMA University
		• International Rice Research Institute, Phillippines
		• International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Hydrabad
		• CHIBA University, Japan
		• Borlaug Institute for South Asia (BISA), CYMMIT Jabalpur
		National Institutes
		• IIIT & DM, Jabalpur
		• Regional Remote Sensing Application Centre, Nagpur
		• ICAR (Umbrella MoU)
		• Indian Agricultural Research Institute, New Delhi
		• Indian Institute of Remote Sensing IIRS, Dehradun.
		JNKVV has signed MoU with the 33 organizations including national and international institutions and universities during last five years.
		• Need based Collaboration with other organizations
		• No of projects received from different organizations.
		  • International -2
		  • National – 74

<u>List of externally funded sanctioned project over last five years</u>

Project sanctioned during 2013-14

S. No.	Title	Name of PI/Co PI	Amount (Rs. In lakhs)	Duration
Japan International Cooperation Agency-JICA				
1	Maximization of soybean production in Madhya Pradesh	Dr. S. S. Tomar DRS Project Manager	59.51	2013-14
Govt. of India/M.P. and other agencies				
1	Market intelligence (ICAR) Sanctioned vide No. Dir/MI/07/ 06 / 2013 dated 22.6. 13 of Director NCAP, New Delhi.	Dr. P. K. Awasthi Professor (Ag. Econ.)	35.94	July 2013 March 17

		JNKVV Jabalpur		
2	Evaluation and utility of direct application of Gypsum and its mixture with low grade rock phosphate, feldspar, vermi compost, poultry manure and cow dung in different crops of Vindhya Plateau of Madhya Pradesh" No. FAGMIL-6/(Agr-22/1591 dated 5.8.2013 of Dy. General Manager (Tech.) FAGMIL, Jodhpur	Dr. S. R. S. Raghuwansi Associate Professor (Soil Science) College of Agriculture, Ganj Basoda (Vidisha)	13.593	August 13 August 16 FAGMIL
3	Metagenomic analysis of the 1-Aminocylopropane-I-Carboxylate Deaminase gene (AcdS) diversity of rhizospheric and endophytic bacterial population associate with wheat"(Govt. of India-DST)	Dr. Iti Gontia Mishra Research Associate Biotechnology Centre JNKVV Jabalpur.	24.50	1.7.2013 30.6.2016 GOI
4	Development of an improved seed drill chock indicator 6(DBT, Govt. of India) I7DP/IND/2012/28/General/ da8ted 18.9.2013	Dr. A. K. Rai, Associate Professor, Instruments Dev. & Service Centre, JNKVV Jabalpur	18.38	2 years GOI
5	Human Resources & Skill Development in Medicinal Plants through facilitation centre. (NMPB, Govt. of India) Z-18017/190/Pr.FC/MP-01/2013-14 NNPB dated2373 dated 11.10.2013	Dr. S. D. Upadhayaya Professor (Plant Phy.) JNKVV Jabalpur	27.00	3 years GOI
6	Exploration, collection and characterization of lentil germplasm in Madhya Pradesh (ICARDA) -email dated 29-10.2013	Dr. Sunita Panday, Scientist (PB & Gen) College o f Agriculture, Jabalpur	6.30	(2013-14) ICARDS
7	Dissemination of Cost effective integrated Pest Management (IPM) Technology under FTTF (Sanctioned by NABARD) रा. बैं / म.प्र.क्षे.का. भोपाल / डी.पी. पी–एफ.एस. / एफ टी.टी.एफ. / आई.पी. एम.2013 दिनॉक 23.12.2013	Dr. Yogesh Patel Scientist (Entomology) College of Agriculture Ganj Basoda (Vidisha)	5.27 (2 years)	NABARD
8	Survey, collection and conservation of wild and traditional agricultural cultivars of Vindhya Plateau of MP	Gyanendra Tiwari Associate Professor	7.70 2 years	MP Biodiversity Board

	NoMPSBB/M(P)/2014/47 dated 24.1.2014	Ganj Basoda (Vidisha)		
9	Pilot study for estimation of seed, feed and wastage ratios of major food grains in Madhya Pradesh F.No./14(28)/2013 Admn-1 dated 23.2.2013	Dr. Hari Om Sharma Director AERC JNKVV Jabalpur	7.14	ICAR New Delhi

Project sanctioned during 2014-15

S. No.	Title	Amount (Rs. In lakhs)	Duration	Name of PI
1	Genetic improvement of non toxic Jatropha varieties for bio-fuels and animal feeds ICRAF letter No. nil dated 14.4.14	6.12	2014-15	Prof. V. K. Gou Senior Scientist (JNKVV Jabalpu
2	Maximization of soybean production in Madhya Pradesh	72.52	2014-15	Dr. S. S. Tomar Project Manager
3	*Biotechnology Lab. Ke Unnayan ke Liye* क्रमॉक/कृषि/अनु/3/1/14/33 दिनॉक 26.6.2014	200.00	Onetime	Executive Engin Dr. Sharad Tiwa
4	Estt. Of College of Agriculture, Waraseoni (Balaghat) क्रमॉक/कृषि अनु/3/1/14/ 31 दिनॉक 26.6.2014	2391.00	Onetime	Mandi Board
6	Shelf life enhancement of maize and small millets based food products prepared from local varieties of MP using Radiation process No.35/14/02/2014-BRNS/0116 dated 17.4.2014	23.815	3 years	Dr. (Smt.) Alpan Singh, Assoc. Pr (Home Science)
7	Strengthening of Krishi Vigyan Kendra through Rashtriya Krishi Vikas Yojna" FNo/1-14/2014/RKVY dated 24.6.2014	373.81	Onetime	Dr. T. R. Sharma Director Extensi JNKVV Jabalpu
9	Studies on promotion of natraceutical small millets among the people of Madhya Pradesh for food and nutritional security Ref: No/MPSBB/M(P)/2010/ 1230 dated 11.8.2014	9.935	2 years	Dr. R. P. Joshi Senior Scientist (PB) College of Agriculture, Rew
10	Conservation through rejuvenation of old mango orchards in Rewa (M.P.) Ref: No/MPSBB/M(P)/2010/1232 dated 11.8.2014	9.507	2 years	Dr. Rajesh Singh SMS (Horti.) Krishi Vigyan Kendra, Rewa

11	Measurement of vegetation and biomass parameters under vegetation carbon pool assessment (VCP)" e-mail dated 28.8.2014 of Group Director FEG NRSC Hyderabad	14.61.	3 years 2014-17	Dr. S. D. Upadhayaya Professor Plant Physiology JNKVV Jabalpur
12	Promotion of low cost precision farming technologies for diversification of livelihood option and poverty alleviation among small and marginal farmers Ref: राबैं.म.प्र.क्षे.का.भोपाल/एफ.टी.टी. एफ/3744 DPR/14/2014–15 दिनॉक 24 सितम्बर 2014 एन नीरजा, सहायक महाप्रबंधक का पत्र	8.31		Dr. Vijay Agrawal Scientist (pl Path) College of Agri Jabalpur
13	"Web enable weather based decision support system for forewarning and management of important pest-diseases of soybean and chickpea in Bundelkhand zone of MP. No.NRDMS/11/2082/013(G) dated 12.9.2014	25.804	2 years	Dr. A. K. Srivastav Asstt. Prof (Agro meteorology) CoA, Tikamgarh
14	Molecular characterization of new plant types (NPTs) of rice developed by JNKVV. Jabalpur No.5026/CST/R&D/BioSci./2014 Dated 23.12.2014	5.08	2 years	Dr. Yogendra Singh, Scientist (Biotechnology) JNKVV. Jabalpur
15	Low cost processing technology for bio-ethanol production from waste potatoes using different microorganisms"No.5027/CST/R&D/ BioSci./2014 Dated 23.12.2014	4.58	2 years	Dr. L.P.S. Rajput Professor (Biotech) JNKVV Jabalpur
16	Collection, isolation, patho-genecity evaluation and molecular characterization of *Microphomina phaseolina* causing charcoal rot of soybean" No.5028/CST/R&D/ BioSci./2014 Dated 23.12.2014	4.68	2 years	Dr. R. K. Verma Principal Scientist (Plant Pathology) JNKVV Jabalpur
17	Impact of water stress on secondary metabolites production of medicinal plants used as memory enhancer No.5030/CST/R&D/ BioSci./2014 Dated 23.12.	4.68	2 years	Dr. S. D. Upadhayaya Professor Plant Physiology JNKVV Jabalpur

Project sanctioned during 2015-16

S. No	Title	Amount (Rs. In lakhs)	Name of PI	Funding agency
1	Maximization of soybean production in Madhya Pradesh	74.15	DRS and Project Manager	JICA-Jap 2014-15
2	Strengthening of communication and knowledge management centre for farmers and stake holders	277.80	DES, JNKVV, Jabalpur	RKVY Govt. of I
3	Establishment of Phyto-Sanitary Lab. At JNKVV, Jabalpur Part-A - Post Entry Quarantine Laboratory at JNKVV, Jabalpur Part-B- Establishment of Pesticide Residue Analysis Laboratory Rs. 827.00 lakhs	155.75 827.00	Prof. & Head Plant Pathology Dr. B. Sachhidanand Professor (Soil Sci.)	RKVY Govt. of I Through Dept. of FW&AD Bhopal
4	एकीकृत जलग्रहण क्षेत्र प्रबंधन कार्यक्रम के मूल्यांकन बावत। Sanctioned : vide letter S. No. 971/ 22/ V-9/RGM/2015 dated 17.6.2015	3.50	Dr. Hari Om Sharma Director, Agro-Eco Research Centre, JNKVV. Jabalpur	Departme of Pancha and Rural Dev. RGMWM Bhopal.
5	Integrated farming system for improvement of nutritional and livelihood of farmwomen under different ecosystems" No. 1-15012/15.Admn/20222 dated 25.7.2017	14.30	Dr. V. K. Shukla Principal Sci. (Agro) JNKVV. Jabalpur	ICAR-CI Bhubanes r
6	Collection and evaluation of elite local landraces of maize for successful commercial breeding advancement program in Madhya Pradesh No.1086/CST/R&D/(BS)2015 dated 30.6.2015	3.68	Dr. Sanjay Singh Scientist (PB) JNKVV Jabalpur	MP Coun of Scienc Tech. Bh
7	CRP on Hybrid Technology on wheat	17.60	Dr. R. S. Shukla Principal Scientist (PB) JNKVV. Jabalpur	ICAR, Ne Delhi
8	CRP on Hybrid Technology on Rice	18.10	Dr. Dr. G.K. Koutu Principal Scientist (PB) JNKVV. Jabalpur	ICAR, Ne Delhi
9	PGR management and use of sesame component – I (Characterization, regeneration, distribution and documentation)	6.00	Dr. (Smt.) Rajni Bisen, Sr. Scientist (PB) PC Unit (S&N) JNKVV, Jabalpur.	NBPGR (ICAR) N Delhi.

10	**P-403** CRP on Agro-biodiversity PGR II	2.00	Dr. A. K. Bhowmick Principal Scientist JNKVV. Jabalpur	NBPGR (ICAR) New Delhi.
11	**P-406** Extra Mural Project On Exploiting Wild Gene Pool Through Pre-Breeding For Introgression Of Yellow Mosaic Disease Resistance In Soybean-Jabalpur	0.59	Dr.A. N. Shrivastava Principal Scientist (PB)	ICAR, New Delhi
12	**P-428"** Shuttle Breeding for Developing Wheat Genotypes of warmer areas, **Powarkheda**	1.66	Dr. P. C. Mishra Principal Scientist (PB) ZARS. Powarkheda	IIWBR (ICAR) Karnal
13	P-429 Shuttle Breeding for Developing Wheat Genotypes of warmer areas, Jabalpur	1.66	Dr. R. S. Shukla Principal Scientist (PB) ZARS. Powarkheda	IIWBR (ICAR) Karnal
14	P-430 NICRA - Phenotyping and genetics enhancement for tolerance to prioritized abiotic and biotic stress in wheat	9.60	Dr. P. C. Mishra Principal Scientist (PB) ZARS. Powarkheda	IIWBR (ICAR) Karnal (Haryana)
15	P-431 Biotic stress in wheat under changing climate scenario	13.00	Dr. K. K. Mishra Scientist (PP) ZARS Powarkheda	IIWBR (ICAR) Karnal
16	P-433 Tribal sub plan (TSP) IIWBR-AICW and BJP	3.50	Dr. R. S. Shukla Principal Scientist (PB) ZARS,Powarkheda	IIWBR (ICAR) Karnal
17	Strengthening of infrastructure facilities for enhancing hybrid rice parental lines production at JNKVV. Farms – Jabalpur	143.76	Dr. D. K. Mishra Director Farms, JNKVV Jabalpur	Govt. of India RKVY
18	Strengthening of infra-structure facilities of Tikamgarh Farm for enhancing Breeder Seed Production of Soybean and wheat,	213.92	Dr. D. K. Mishra Director Farms, JNKVV Jabalpur	Govt. of India RKVY
19	Strengthening of infrastructure facilities for enhancing Breeder Seed Production of parental lines of early maturing maize hybrids at Chhindwara	125.11	Dr. D. K. Mishra Director Farms, JNKVV Jabalpur	Govt. of India RKVY
20	Strengthening production of Bio-agents (Microbial insecticides) and their promotion	175.96	Dr. S. B. Das Principal Scientist JNKVV. Jabalpur	Govt. of India RKVY

Project sanctioned during 2016-17

S. No.	Title	Amount (Rs. In lakhs)	Name of PI	Funding age

1	"Enhancing area under direct seeded rice for conserving natural resources in Eastern Madhya Pradesh Ref: E-mail dated 19.3.2016 addressed to Dr. Manish Bhan	19.27 (2 years)	Dr. Manish Bhan Scientist (Agronomy) Dept. of Physics & Agromet, JNKVV,Jabalpur.	PI Industries Limited Gurgaon
2	Baseline study on demographic and health pattern in and around the proposed Atomic Power Plant at Chutka Ref: No.36(5)/14/2015-BRNS/ 36029 dated 31.3.2016	Rs. 32.62 lakhs	Dr. Anubha Upadhayay Senior Scientist (Physio) JNKVV, Jabalpur	BRNS Govt. of India
3	National Initiative for setting up Design Innovation Centre (DIC)	100.00 3 years	Dr. Sharad Tiwari Director BTC JNKVV. Jabalpur	MoHRD Govt. of India
4	Seed Hubs for increase indigenous production of pulses in India Ref: DO/CS13/(2)2016/OP/492 dated 5.5.2016	150.00	Dr. Anita Babbar Principal Scientist (PB) JNKVV. Jabalpur	The Director Indian Institute of Pulses Research, Kalyanpur, Kanpur
5	Enhancing breeder seed production for increasing indigenous production of pluses in India F No. 18-9/ 2016 / NFSM dated 28.06.2016)	190.00	Dr. D. K. Mishra Director Farms JNKVV. Jabalpur	Govt. of India (NFSM)
6	Field evaluation of Trombay mutants selections and research activities in Agriculture" F.No. BARC/NABTD/95119 dated 28.06.2016)	50.00 (5 years)	Dr. D. K. Mishra Director Farms JNKVV. Jabalpur	BARC Govt.of India
7	Characterization of Security Paper Mill effluent and assessment of its impact on Soil properties No.4580000631 dated 12.11.2016	24.91	Dr. H. K. Rai, Senior Scientist, Dept. of Soil Sci. & Agril. Chemistry College of Agriculture, JBP	Security Paper Mills, Hoshangabad
8	Strengthening of bio-fertilizer and bio-control agent production unit at JNKVV. Jabalpur e-mail dated 18.11.2016 of Dr. N. P. Singh, Director, IIPR Kanpur.	98.00	Dr. B. Sachhidanand Principal Scientist (Soil Sci.) JNKVV. Jabalpur	The Director Indian Institute of Pulses Res., Kalyanpur, Kanpur

Project sanctioned during 2017-18

S. No.	Title	Amount (Rs. In lakhs)	Name of PI	Funding ager
1	Education and Sustainable Development (ESD) focussing on school lunch with adopting Indian crops in Madhya Pradesh (vide e-mail dated Dec. 6, 2017)	10.00 (one year)	Dr. L. P. S. Rajput Prof. & Head Dept. of Food Sci, JNKVV. Jablpur	**Chiba Univer** Chiba (Japan) Through Govt India. New De
2	Development of Model Farms of Enhancing the Breeder Seed Production at JNKVV Farms No./B-1/2014/14-2 dated 4.5.2017	101.50 (2017-18)	Director Farms JNKVV Jabalpur	Govt. of India (under RKVY
3	Strengthening of Crop Quality Analysis and Food Product Testing Laboratory No./B-1/2014/14-2 dated 4.5.2017	241.59 (3 years)	Dr. S. S. Shukla Principal Scientist Dept. of Food Science Jabalpur	Govt.of India (under RKVY
4	Capacity building programme on Agri-Business opportunities for Farmers Producer Organization (FPO) No./B-1/2014/14-2 dated 4.5.2017	15.00 (2017-18)	Dr. S. B. Nahatkar Associate Director Res. JNKVV. Jabalpur	Govt.of India (under RKVY
5	Module for medium term conservation of germplasm No./B-1/2014/14-2 dated 4.5.2017	34.00 (2017-18)	Dr. P. C. Mishra Principal Scientist (PB) ZARS. Powarkheda	Govt. of India (under RKVY
6	JNKVV Research Chair in Agricultural Economics No. 1193/SPC/PMPSU/Chair/2016 dated 11.5.2017	109.96 (2 years)	Head, Dept. of Agril. Economics, JNKVV Jabalpur	State Planni Commission, Govt. of M Bhopal
7	Technology advancement and assessment for rapeseed-mustard production in rice fallow areas of Eastern India" F. No. 9-3/2017/Oilseeds/CA/ dated 30.5.2017	13.72 2017-18	CCPI : Dr. Shiv Ratan Associate Professor (Pl. Breeding & Gen)	Min. of Agri. Farmers Welfare (Oilseeds Div. Govt .of India New Delhi DRMR, (CAR

				College of Agriculture, Tikamgarh	Saver Bharatpur
8	Study on extent of participation and impact of e-NAM on stakeholders of Bundelkhand region of MP No.303/CST/R&D/R&D (BioSci)/2018 dated 10.1.2018	4.87 (2 years)	Dr. Anil Mishra Assistant Professor (Humanities) College of Agriculture, Tikamgarh	DG MP Council of Science & Technology , Vigyan Bhawan, Science Hills Bhopal 462 003	
9	Validation of IPM schedule for insect pest of rice	8.10 (2 years)	Dr. Raju Panse Scientist (Ento.) College of Agriculture , Waraseoni	MP Council of Science and Technology, Vigyan Bhawan Bhopal	
10	”Strengthening of existing road network at JNKVV, Jabalpur to under pin the path for transfer of technology” (RKVY-RAFTAAR	349.27	Director Extension Services, JNKVV. Jabalpur	Director, Directorate Farmers Welfare and Agriculture Development, Govt. of MP, Vindhyachal Bhawan, Bhopal	
11	Establishment of Horticultural Research and Demonstration Farm. **Sanctioned** vide leter of PS, Dept. of FW&AD No. B-1/1/2014/1472 dated 21.5.2018 (Proceedings of SLSC)	55.36 (2 years)	Dr. Akhilesh Tiwari, Senior Scientist (H) DHRTC, Garhakota (Sagar)	Director Horticulture and Farm Forestry, Govt. of MP, 6th floor,Vindhyachal Bhawan, Bhopal	
12	Farm Mechanization for soybean based cropping systems in Central India **Sanctioned** vide F. No. 9-3/2018/Oilseeds/CA dated 21st June 2018	93.75 (2 years)	Dr. Amit Jha Scientist (Agronomy) JNKVV. Jabalpur	Addl. Commis. Govt. of India Min. of FW Dept. of Agril. Cooperation & FW, 37-B, Krishi Bhawan, New Delhi	
13	Development of protocols for procurement, safe storage and	20.24 (2 years)	Dr. Mohan Singh	Ministry of Consumers	

			milling of out turn of major pulses20.24 lakhs e-mail dated July 1, 2018		Prof. & Head PHTE, College of Agril. Engineering JNKVV. Jabalpur	Affairs and , Food and Public Distribution Govt. of India, New Delhi
		14	Tejswani Karyakram: a) Impact of Tejswani Rural women empowerment program on empowerment of of rural women through cultivation, processing and marketing of kodo/kutki in Madhya Pradesh(Rs .4.76) b) Impact of Tejswani Rural women empowerment program on empowerment of of rural women through SRI in Madhya Pradesh (Rs. (Rs. 4.60 lakhs) c) Impact of Tejswani Rural women empower ment program on empowerment of of rural women through Vegetable production in Madhya Pradesh (Rs. 5.49)	14.85	Dr. Hari Om Sharma Director, AERC Dept. of Agril. Econ. College of Agri. Jabalpur	Madhya Pradesh *Mahila Vitta evam Vikas Nigam* (MVVN), Bhopal
		15	"Intensification of *Sesame* production in Bundelkhand Agro-Climatic Zone of Madhya Pradesh" Sanctioned vide letter No. 9-7@2018 Oilseeds/863 dated 17.09.2018(Under NFSM)	15.21 (2 years)	Dr. Shiv Ratan, Senior Scientist (Plant Breeding & Genetics), College of Agriculture, Tikamgarh	Department of Agriculture, Govt. of India Room N. 297-D, Krishi Bhawan, New Delhi 110 001
		16	Introduction and expansion of *Chenopodium quinoa* in the rainfed rice fallow region climatically vulnerable tribal districts of Madhya Pradesh ensuring food nutrition and sustainable rural livelihood security" (ICAR) Ref: F. No. 10(19)2017-EP&HS dated 12.10.2018 ADG (EDu. Planning and HS)	122.37	Dr. G. K. Koutu Principal Scientist (Plant Breeding) JNKVV. Jabalpur	ICAR, New Delhi

17	Utility of drone technology in precision farming of commercial crops in Madhya Pradesh	17.70 lakh (2018-19	Dr. V. K. Paradkar Associate Director Research, ZARS Chhindwara	Mahindra & Mainidra Limited, Mumbai	
18	Collection, characterization, and standardization of tissue culture regeneration protocol of chironj for protected forest area of Madhya Pradesh	55.00 lakh rupees	Dr. R. Shiv Ramakrishnan Mudaliyar, scientist, Seed technology ZResearch Centre, Plant breeding Department, JNKVV, Jabalpur.	DBT, GOI, New Delhi	

Government of India funded long term projects/centre (as on 1.12.2019)

1	Agro Economic Research Centre	100.00	*1958 Continu*
2	Comprehensive plan scheme for study of cultivation/ production of principal crops in Madhya Pradesh.	380.00	*1970 Continu*
3	Centrally Sponsored Scheme on spices development	26.21	1988 continue

List of MoUs signed by JNKVV with other Universities/Research institutes/ organizations

S.N.	**Name of Institutes**	**Date**
With International Institutes		
1.	JNKVV Jabalpur – Chiba University, Japan	23.11.201
With ICAR Institutes		
2.	Indian Institute of Horticultural Research (IIHR) Bangaluru (KN)	11.04.201
3.	JNKVV-ICAR (Umbrella MoU)	10.11.201
4.	ICAR-National Research Centre on Litchi, Muzaffarpur (UP)	31.03.201
5.	ICAR-National Research Centre on Pomegranate, Solapur (MS)	15.07.201
6.	ICAR-Directorate of Rapeseed-Mustard Research, Bharatpur (Raj.)	07.12.201
7.	ICAR-Indian Institute of Soil Science, Nabibagi, Bhopal	08.12.201
8.	Central Tuber Crops Research, Sreekariyam, Triruvananthauram	19.04.201

9.	ICAR Directorate of Weed Science Research, Jabalpur	26.06.2018
10.	ICAR Indian Institute of Oilseeds Research, Hyderabad(Umbrella MOU)	4.10.2018
Govt. of India and its agencies		
11.	Bhabha Atomic Research Centre (BARC) , Trombay, Mumbai	3.7.2015
12.	National Fertilize Limited, New Delhi	1.10.2015
13.	National Institute of Hydrology (Regional Centre, Bhopal)	07.2017
14.	Southern Region Farm Machinery Training and Testing Institute (SRFMTTI), Garlandinne, Anantpur (Andhra Pradesh)	25.08.2017
15.	Indian Council of Forestry Research and Education (ICRRE), Uttra-khand	06.12.2017
16.	Protection of Plant Varieties & Farmers Right Authority (PPV&FRA) Ministry of Agriculture Cooperation and Farmers Welfare, New Delhi	5.02.2019
JNKKVV with other UNIVERSITIES		
17.	Punjab Agricultural University, Ludhiana (Punjab)	30.04.2016
18.	Anand Agril. University Anand (Gujrat)	11.102016
19.	Indira Bandhi Krishi Vishwa Vidyalaya, Raipur (Chhattisgarh)	05.10.2017
20.	University of Horticultural Science, Bagalkot (Karnataka)	16.02.2018
21.	Rajmata Vijayraje Scindia Krishi Vishwa Vidyalaya (RVSKVV), Gwalior	20.04.2018
22.	Sir Hari Singh Gour University, Sagar (MP)	22.05.2018
State Govt. of MP and Its agencies		
23.	MBCFPL (Madhya Bharat consortium of Farmers Producers Company Limited, Bhopal	6.2.2017
24.	MP State Planning Commission, Bhopal	09.03.217
25.	JNKVV-Jabalpur & MP State Krishi Vipran Board (Mandi Board)	18.05.2017
26.	JNKVV-MP *Mahila Vitta Evam Vikas Nigam*, Bhopal.	7.7 2018
27.	Raj-Bhawan (Governor House), Bhopal	28.07.2018
With Private Agencies		
28.	Bayer Bioscience Pvt.Limted-JNKVV, Jabalpur	13.4.2015
29.	JNKVV-PI Foundation (Pesticide Industries), Gurgaon	11.05.2015
30.	JNKVV-Krisco Agrotech India Pvt. Limited, Gwalior	15.04.2017
31.	JNKVV-Jabalpur – ASCI, Gurugram (Haryana)	9.06 2017
32.	JNKVV-Bio-Technology Development Association of India (BDAI)	28.04.2018

	33.	Mahindra & Mahindra - JNKVV Jabalpur (Drone Technology)	9.01. 2019
	viii)	AU's future plans, strategic development plan, vision, etc. documented	JNKVV has planned to work with the aim • To serve as a centre of teaching and training in the field of Agriculture and Allied Sciences. • To conduct basic, strategic, applied and anticipatory research in the field of Agriculture and Allied Sciences. • To disseminate technology to farmers, extension personnel and organizations engaged in agricultural development through various extension programmes. **JNKVV Vision** Providing services for better rural livelihood and resource poor farming community, providing equal opportunities of education, research and extension activities for enhancing productivity, profitability and sustainability of agricultural production system and quality of rural livelihood. The University addresses and is committed to render services to combat upcoming challenges of the rural sectors.
10	**Details of pre-requisite information needed in main proposal**		
	i)	Availability of PME cell to support the project	University has PME cell headed by the Associate Director of Research at Directorate of Research JNKVV. The projects funded by agencies is periodically monitored and evaluated through field visits, presentations and progress reports by the PME cell of university.
	ii)	Base line survey on the proposed thrust area	• There are 250 officials trained in RS and GIS activities out of total official staff of about 6000 in the Field of Agriculture, Horticulture and Agricultural Engineering in MP Government. • Two agricultural universities in Madhya Pradesh producing more than 1200 students every year who are friendly with the IT field. These students can be trained in RS and GIS application field. • Madhya Pradesh Council of Science and Technology (MPCOST) and few other departments working in this area and are not able to cater the need of skilled man power in this field. • Satellite data was used to prepare thematic maps including crop and land use map of Tons Basin (1.25 m ha) and Sindh Basin (2.51 m ha) in M.P. for Water Resources Department. At present 45 satellites mission of ISRO are operative and 15 are giving data on earth observations. These missions are very expensive and for civilian purpose most of the data goes unutilized due to unavailability of skilled

		persons. Having trained students, costly satellite data could be used effectively for the betterment of agriculture and rural development. • University is reaching to 12 Lakh farmers regularly through *Kisan Mobile Sandesh* on agro-met advisory. • Big location based data is available on soil tests • Availability of Climatic data on AWS in VV network
	iii) Availability of infrastructure facility (including field facility) on the line of proposal	University is having good facility of well established lab to utilize satellite data for RS and GIS application. Department of Soil Science at Agriculture College is also having trained faculty and lab facility well equipped with hardware and software. Software like Arc GIS and ERDAS Imagine are also available.
	iv) Interdisciplinary faculty strength associated with project	University is running courses of Remote Sensing and GIS in all agriculture and agricultural engineering colleges at UG, PG and Ph.D. level. Agricultural Engineering college, Jabalpur is having faculty well trained from Indian Institute of Remote Sensing, Dehradun, SAC Ahmedabad, IARI New Delhi and NAARM Hyderabad. There are good linkages with different departments of state and central Govt. Departments of Soil and Water Engineering, Farm Machinery and Power, Post harvest & food Engineering, Soil Science, Crop Physiology, Agronomy, Entomology, Plant pathology, Agriculture Economics, Horticulture, Forestry and Agro-metrology etc works in hand to hand for the different projects of RS and GIS application.
11	**Details of interdisciplinary team for the proposed project with concise CV of all members associated with the project proposal with citation index and h-index**	

S.N	**Responsibility**	**Name and designation**
1	**Principal Investigator**	Dr. R.K. Nema, Dean Agricultural Engineering
2	**Co-PI -** Skill Development-International	Dr. M.K. Hardaha Professor, SWE, CAE
3	**Co-PI** -Skill Development-National	Dr. M.K. Awasthi, Professor, SWE, CAE
4	**Co-PI** -Research	Dr. S.K. Sharma, Professor, SWE, CAE
5	**Co PI –** Product Development	Dr. A.K. Rai, Director Instrumentation, JNKVV
6	**Co PI-** Procurement and Finance	Dr. Y.K. Tiwari, Associate Professor, SWE,
7	**Associated Scientists** Natural Resources Management	Dr. M.L Sahu, Associate Professor, SWE, CAE Dr. R.N. Shrivastava, Assoc. Professor, SWE, Dr. S.K. Pyasi, Professor, SWE, CAE Dr. A.K. Bajpai , Associate Professor, SWE Dr. C.M. Abroal, Associate Professor, PHPE

		Associated Scientists Plant Science	Dr. (Mrs) Om Gupta , Director, Extension Services JNKVV Jabalpur Dr. S.K. Pandey, Professor, Horticulture, Dr. P. B. Sharma, Professor, Agronomy, Dr. Rakesh Bajpai, Professor, Forestry, Dr. S.B. Das, Professor, Entomology, Dr. Gyanendra Tiwari , Associate Professor, Plant Physiology Dr. Manish Bhan, Asstt. Professor, Agrometeorology Dr Shivramakrishnan Asstt. Professor, Plant Physiology
		Associated Scientists Big Data Analysis	Dr. S.B. Nahatkar, Director, Agri Business Planning & Development Institute, J.N.K.V.V. Dr. H.L. Sharma, Professor, Stat. and Mathematics Dr. Deepak Rathi, Associate Professor, Agricultural Economics & Farm Management Dr. G.S. Tagore, Asstt. Professor, Soil Science and Agricultural Chemistry Er Manish Patel, Asstt. Professor, FMPE
		CO-PI Knowledge partner	Dr. V.K. Sehgal, Principal Scientist, IARI, New Delhi
		CO-PI Knowledge partner	Dr. S.P. Aggrawal, Head, (NRM), IIRS, Dehradun
			CV presented in Annexure – VIII
12	**Performance indicators**		
	i) Number of industry-sponsored projects and positions in cutting-edge areas of agric-science		Industrial Sponsored Projects Utility of drone technology in precision farming of commercial crops in Madhya Pradesh by Mahindra & Mahindra Limited, Mumbai Enhancing area under direct seeded rice for conserving natural resources in Eastern Madhya Pradesh by PI Industries Limited Gurugram
	ii) Number of competitive grants from a national/international funding agency.		NATP CGP on RS and GIS applications for NRM
	iii) Faculty/student exchange programme initiated with national/international institutions number of technologies commercialized		1127 (181 International)
	iv) Number of research papers published in reputed journals (h-Index)		
	v) Revenue generated from Centre's activities (e.g. consultancies; projects; trainings; commercialization,		Revenue generated in five years Rs. 814.48 lakh

	testing, certification, technology outreach etc.)	
13	**Details of activities related to establishment of CAAST**	
	Details proposals with objective, activity chart and work plan	

Objectives:

It is proposed to establish a Centre of Advanced Agricultural Science and Technology under National Agricultural Higher Education Project on "Skill development to use spatial data for natural resources management in agriculture" with the following objectives.

- To build basic capacity for using RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture and allied sectors.
- To identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water and vegetation.
- To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers.

Objective - I: To build basic capacity for using RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture and allied sectors

The first objective of project is to provide training for "Basic capacity building on use of RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture".

Activities

1. **Awareness program for Students**

    1. Capability of RS and GIS – useful for agriculture with example
    2. Data available – quantity and frequency and unused capacity
    3. Spatial, temporal, extent
    4. Precision, timeliness

5. Buffer areas, decision making

Duration – one day

Outcome

- Acquaintance and curiosity about capabilities of spatial data

2.**Introductory program for administrators**

- Capability of RS and GIS – useful for agriculture with example
- Data available – quantity and frequency and unused capacity
- Spatial, temporal, extent
- Precision, timeliness
- Buffer areas, decision making

Duration – one day

Outcome

- Acquaintance about capabilities of spatial data in their area of interest

3. Educative learning for executives

- Concept of RS and Its application in Agriculture
- Introduction of GIS and Thematic Mapping.
- Capability of RS and GIS – useful for agriculture with example
- Applicability in planning, execution and monitoring the task assigned
- Introduction of ready to use products of RS and GIS applications
    - Classified Land use land cover maps
    - Classified crop maps
    - Ground water potential zone maps
    - Lineament maps for Water harvesting site selection in watersheds
    - Vegetation index maps for crop yield modelling
    - Biotic and abiotic stress assessment
    - Crop area identification
    - Crop classification and monitoring
    - Crop area monitoring and acreage estimation,
    - Crop condition assessment
    - Crop water requirement through RS & GIS
- Planning for agriculture water management through GIS.
- Satellite data availability at open source

- Collection of field data and verification of satellite data

Duration – one week

Outcome

- Preparedness of executives to accept RS & GIS approach for field work.

4. Capacity building for Scientists, Teachers, officials, students and young professionals

- Concept of RS and Its application in Agriculture.
- Satellite, Sensor and Resolution.
- Introduction of GIS and Thematic Mapping.
- Capability of RS and GIS – useful for agriculture with example
- Data available –quantity and frequency and unused capacity
- Applicability in planning, execution and monitoring the task assigned
- Ready to use products of RS and GIS applications
    - Classified Land use land cover maps
    - Classified crop maps
    - Ground water potential zone maps
    - Lineament maps for Water harvesting site selection in watersheds
    - Vegetation index maps for crop yield modelling
    - Biotic and abiotic stress assessment
    - Crop area identification,
    - Crop classification and monitoring,
    - Crop area monitoring and acreage estimation,
    - Crop condition assessment,
    - Crop water requirement through RS & GIS
- Planning for agriculture water management through GIS.
- Data acquisition, analysis and interpretation
- Satellite data availability on open source
- Collection of field data and verification of satellite data
- Introduction to forecasting

Duration – four weeks

Outcome

- Skilled man power acquainted with remote sensing and GIS capability and using spatial data for application areas

Objective II. To identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water and vegetation

Activity:

1. Problem identification in realizing process with satellite and ground data with techniques available. The problems addressed at this point covers

    - Land degradation
    - Soil pollution
    - Crop water stress
    - Low water use efficiency
    - Abiotic and biotic stress in vegetation
    - Grain storage and transportation
    - Declining water resources
    - Low mechanization
    - Low input use efficiency
    - Declining productivity
    - Low income of farmer

2. Making the spatial data maps more precise and accurate using fine resolution data available with present satellite systems will facilitate following tasks (tentative list)

    1. Watershed Monitoring and impact assessment
    2. Ground water potential zoning
    3. Site selection for water harvesting structures
    4. Status of Storage structures and possible sites for Vegetable and fruit storage
    5. Watershed prioritization to control soil erosion for sustainable land utilization
    6. Matching water availability and production in irrigated command and suggestions for increasing the production and farmers income
    7. Preparation of work plan for river revival
    8. UAV mapping based decision support system for crop management strategies
    9. Crop yield modelling & forecasting
    10. Identification of sites for afforestation and selection of appropriate plants
    11. Impact of infestation of Sal borer on carbon stock of Sal forest (Biotic stress)
    12. Ground based high throughput pheno-typing crop varieties for drought and heat tolerance using NDVI as a drought adaptive trait.
    13. Data analysis and management zone delineation for reducing productivity gaps of major horticultural crops.
    14. Impact of watershed management on socio economic status

15. Identification of degraded land and planning for improvement
16. Spatial data based watershed modelling
17. Soil moisture and Nitrogen monitoring for improving input use efficiency
18. Planning co-operative Farming and marketing for appropriate rates-Entrepreneurship development

3. Students undergoing master and doctoral degree program shall be involved to undertake research project on related aspects. They shall be provided research fellowship for the same.

Outcome

- Generating capability of students and faculty for creating thematic maps and integrating them for desired application which is useful for making decisions for managing land, water and vegetation.

Objective - III: To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers

Activity:

Preparation of spatial products containing information on special theme or integrated information for decision making

Thematic information available on GIS platform to derive useful information for drought forecasting, disease forecasting, yield assessment, agricultural related input management for precision farming and marketing of agricultural produce within and outside the country.

1. Preparation of Theme based maps

- land use/cover map
- crop classification map
- horticultural plantation map
- soil map
- topography map
- erosion map
- ground water potential map
- surface water bodies
- Drainage maps
- water logged areas
- irrigation induced salinity
- command area map

- rainfall map
- Forest canopy map
- Deforestation map
- attribute maps of population of men, livestock, machines, etc

2. Preparation of Integrated maps for decision making

- ground water availability map
- site suitability map for soil and water conservation
- crop yield assessment map
- biotic and abiotic stress assessment map
- site suitability map for water harvesting structures
- evaluation and monitoring impact of watershed management
- agro-forestry maps
- afforestation priority map
- watershed prioritization map
- optimized transportation and marketing map

The research shall be promoted to develop such products through master and Doctoral programs. Scholarships to promote the research activities related to project shall be established. Some of the activities like training, capacity building of students, awareness programs may be outsourced to appropriate agency capable of doing so.

Outcome

- Ready to use spatial maps which are user's friendly for decision making in Natural Resources Management in Agriculture.

Activity Chart- Administrative

Year I-2019-20, II 2020-21, III -2021-22, IV- 2022-23

Quarters 1st April-June 2nd July-Sep 3rd Oct-Dec 4th Jan-Mar

S. No.	Activity	I Yr	II Year				III Year				IV Year			
		4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr
1.	Design of module of trainings													
2.	Creation of facilities													
3.	Preparation of Training Schedule and publicity													

4.	Selection of participants													
5.	Recruitment of contractual staff													
6.	Conduction of Programs													
7.	Organization of Seminars													
8.	Report Writing													

Activity Chart- Technical

Objective I: To build basic capacity for using RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture and allied sectors

S. No.	Activity	1 Yr	II Year				III Year				IV Year			
		4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr
1.	Awareness program for Students													
2.	Introductory program for administrators													
3.	Educative learning for executives													
4.	Capacity building for Scientists, Teachers, officials, students and young professionals													

Objective II. To identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water and vegetation.

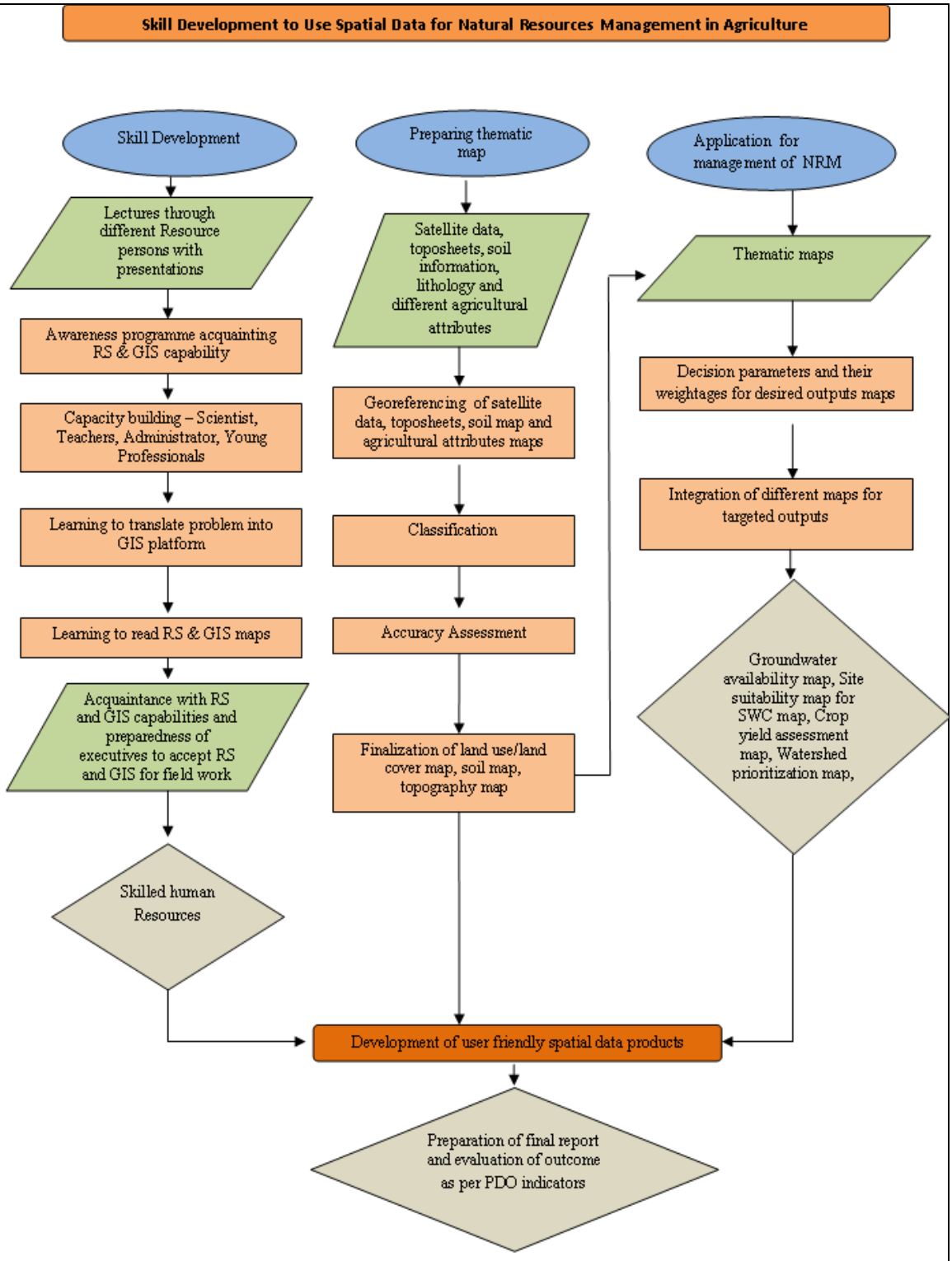
S. No	Activity	I Yr	II Year				III Year				IV Year			
		4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr

1.	Problem identification in realizing process with satellite and ground data with techniques available														
2.	Making the spatial data maps more precise and accurate using fine resolution data available with present satellite systems														
3.	Students undergoing master and doctoral degree program shall be involved to undertake research project on related aspects														

Objective III: To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers

S. No.	Activity	I Yr	II Year				III Year				IV Year			
		4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr	1st qr	2nd qr	3rd qr	4th qr
1.	Preparation of Theme based maps													
2.	Preparation of Integrated maps for decision making													

	3. Proposed Work plan


Skill Development to Use Spatial Data for Natural Resources Management in Agriculture
Skill Development
Lectures through different Resource persons with presentations
Awareness programme acquainting RS & GIS capability
Capacity building – Scientist, Teachers, Administrator, Young Professionals
Learning to translate problem into GIS platform
Learning to read RS & GIS maps
Acquaintance with RS and GIS capabilities and preparedness of executives to accept RS and GIS for field work
Skilled human Resources
Preparing thematic map
Satellite data, toposheets, soil information, lithology and different agricultural attributes
Georeferencing of satellite data, toposheets, soil map and agricultural attributes maps
Classification
Accuracy Assessment
Finalization of land use/land cover map, soil map, topography map
Application for management of NRM
Thematic maps
Decision parameters and their weightages for desired outputs maps
Integration of different maps for targeted outputs
Groundwater availability map, Site suitability map for SWC map, Crop yield assessment map, Watershed prioritization map,
Development of user friendly spatial data products
Preparation of final report and evaluation of outcome as per PDO indicators

4. Stakeholders/ Industry participation plan

- Educated Youth in Agriculture
- Graduate and post graduate students in Agriculture, Agricultural Engineering, Information Technology, and Computer etc.
- Department of Water Resources Govt. of M.P.
- Department of Farmers Welfare and Agricultural Development Govt. of M.P
- Department of Horticulture Govt. of M.P
- Rural Development department Govt. of M.P.
- Related industries dealing with RS and GIS s/w and supporting systems
- JNKVV Jabalpur

i)	Master and PhD students programme for the exposure of students to national/international universities/institutions	**PG and PhD students shall be exposed to international and National Institutes for their research projects in respective disciplines including d**epartments • Soil and Water Engineering, • Farm Machinery and Power, • Post harvest & food Engineering, • Soil Science, • Crop Physiology, • Agronomy, • Entomology, • Plant pathology, • Agriculture Economics, • Horticulture, • Forestry • Agro-meteorology
ii)	Modern research facilities for carrying out advanced post graduate research for increasing the quality of student research	Spectral Radio meter, digital spectral radiometer, GPS, unmanned aerial vehicle, Drone & Drone based sensors, Satellite data receiving equipments, thermal data mapper, studio for outreach program, digital electrical resistivity meter.
iii)	Conducting capacity building programmes for students, faculty and research scholars across the country	Students from Agriculture, Agricultural Engineering, IT and Computer shall be exposed to RS & GIS application in Agriculture as per the activity given at S.N.4 in objective-I. The faculty as well as research scholar across the country will also be benefited by this module of 4 weeks duration covering the scope applicability, possible area of application for different aspects of agricultural

		development as well as data acquisition, analysis and decision making process for managing NRM in agriculture.
	iv) Faculty upgradation through international and national trainings for preparing high quality human resources essential for quality teaching and research in Agricultural Universities	Faculty involved from the Departments of Soil and Water Engineering, Farm Machinery and Power, Post harvest & food Engineering, Soil Science, Crop Physiology, Agronomy, Entomology, Plant pathology, Agriculture Economics, Horticulture, Forestry and Agro-metrology shall be exposed to national and international work on related aspects for their knowledge up gradation as well as hands on training for preparing high quality human resources.

Collaboration with national and international centres of excellence in education and research

National Level

S. No.	Name of Institute	Area of collaboration /knowledge sharing	Contact Person
1.	IARI, New Delhi	Remote sensing applications in different areas viz. Climate change, drought analysis, hyperspectral remote sensing in identification of crop stress.	Dr. V.K Sehgal:
2.	IIRS, Dehardun	Application of Geospatial technology in hydrological modelling, climate change studies and irrigation water management.	Dr. S.P. Agrawal
3.	IIIT&DM, Jabalpur	Mathematical and statistical techniques in developing different model	Dr. Aparajita Ojha
4.	CSRE, IIT, Bombay	Data Mining and wireless sensor network for precision agriculture and crop disease, Geo-informatics applications for rural development planning	Dr. J Adinarayana
5.	IIT, Roorkee	Watershed hydrology, remote sensing and GIS applications in distributed modelling of rainfall-runoff-soil erosion process.	Dr. Manoj Jain
6.	IIT, Roorkee	Geospatial technology application in water resources estimation, identification of location of soil and water conservation measures	Dr. Ashish Pandey
7.	NIH, Roorkee	Development of methodology for drought vulnerability assessment and improvement of irrigation water use efficiency in canal command areas	Dr. R.P. Pandey
8.	MANIT, Bhopal	Assessment of irrigation system performance, evapo-transpiration estimation techniques and hydrological modelling of agricultural watershed and development of design and educational software	N.S. Raghuvanshi
9.	NIT, Patna	Advanced remote sensing and GIS application in hydrology, water resources, climate change, river system, water quality modelling	Dr. Ramakar Jha

10.	ISRO, Hyderabad	Watershed modelling, water flow simulation, integrated river basin management, forest hydrology using remote sensing and GIS application.	Dr. Prveen Gupta
11.	SAC, Ahmedabad	Integration of remote sensing observations in the field of hydrology and river flow modelling, study of land atmosphere integration at different hydrological scale	Dr. Amit Dubey
12.	IIRS, Dehradun	Hydrological modelling (water level estimation in inland water bodies and river discharge estimation using remote sensing and GIS).	Dr. Arpit Choksey
13.	IIT, Bombay	Bioenergy, bio processing, downstream processing, food processing, paper and pulp engineering	Dr. Amit Arora
14	SAC, Ahmedabad	Spatial temporal data mining, microwave remote sensing, multi sensor satellite remote sensing data application for crop monitoring and forecasting.	Dr. D.R. Rajak
15	MPCOST, Bhopal	Remote sensing and GIS application in crop modelling.	Dr. G.D. Bairagi

International level

S. No.	Name of Institute	Area of collaboration /knowledge sharing
1.	Asian Institute of Technology Geoinformatics Center P.O. Box 4, Klong Luang, Pathumathani 12120, Thailand	Remote Sensing application in hazard risk assessment as well as Drone and Drone based technology for mapping different thematic areas
2.	New Maxico State University, College of Agricultural, Consumer and Environmental Sciences Las Cruces, New Maxico	Role of Spatial and temporal heterogeneity of soil properties on plot and field scale under different ecosystem and Carbon Sequestration in soils
3.	Centre for Remote Imaging, Sensing And Processing (CRISP), National University of Singapore 10, Lower Kent Ridge Road Blk S17, Level 2, Singapore 119076	Processing of Hyper spectral Data and its application in Agriculture
4.	University of Zadar, Department of Geography, Croatia, Southeast Europe Ul. Dr. Franje Tudmana 24i	Application of Big Data Analysis in NRM and Agriculture
5.	Royal Melbourne Institute of Technology, 124 La Trobe St, Melbourne VIC 3000, Australia	RS & GIS Applications for sustainable Agriculture

v)	Adjunct/Visiting Professors, Scientists on sabbatical leave from outside the state/country to participate in	IARI and IIRS shall be our knowledge partner for application of RS and GIS in agriculture. The scientists involved are Dr. V. K. Sehgal, Principal Scientist, IARI, New Delhi Dr. S.P. Agrawal, IIRS, Dehradun

	teaching and research programme of SAU and to mentor PG students	Visiting professor/Scientist who are ready to mentor PG students and to participate in teaching and research programme of JNKVV. Dr. Manzul Hazarika, AIT, Bangkok, Thailand Dr. J. Adinarayana, Head, CSRE, IIT, Bombay Dr. N.S. Raghuwanshi, MANIT, Bhopal Dr. Aparajita Ojha. IIIT&DM Dr. Manoj Jain, IIT, Roorkee Dr. Ashish Pandey, IIT, Roorkee Dr. R.P. Pandey, NIH, Roorkee Dr. Manoj Shukla, New Texas Dr. Ramakar Jha, NIT, Patna Dr. Praveen Gupta, ISRO, Hyderabad Dr. Amit Dubey, SAC, Ahmadabad Dr. Arpit Chouksey. IIRS, Dehradun Dr. Amit Arora, IIT, Bombay Dr. D.R.Rajak SAC Ahmadabad Dr. G.D. Baragi MPCOST Bhopal The list is not exhaustive
	vi) Distinguished Lecture Series/Special lectures	Lectures will be organized on specialized subjects by leading speakers and specialized scientist to fulfil the requirement of faculty, students and scientific staff involved in the project as well as in the university. The invited lectures shall also be arranged during the activities in the objective I to aware the administrators and executives and for capacity building of scientists, teachers and officials.
	vii) Collaboration with industries related to the specialized areas	The manufacture of scientific equipments, required sensors used, software used and equipments procured for the project shall be involved in the project for collaboration to efficiently use the gadgets. Agencies like NRSA, IIRS has special mention for collaboration for using space technology. Sugarcane industries, food industries, oil industries and other agro based industries will be collaborated to visualize the use of spatial data for better management of resources. Govt. agencies like FCI, *Krishi Upaj Mandi*, Watershed Management, PMKSY etc. may also be involved for using spatial data.
	viii) Development of short courses for skill development: Two weeks to three months short courses in association with industry concerned will provide job-	Skilled development programs are designed for school students (1 day), for administrator (1 day) and for executive (1 week) to create awareness of technology. The capacity building program of four weeks is designed for scientist, teachers, officials, students and young professionals to develop skilled manpower acquainted with RS and GIS capability and using spatial data for application area.

	driven short programmes	
	ix) Attempts for Increasing visibility of Agricultural Universities and attracting talented students to Agricultural Education	1. Large scale sensitization about RS and GIS technology among school students, to explain modern agriculture, mechanization in agriculture, IT based application in agriculture net based input and marketing system awareness for agriculture and national importance of agricultural production system. 2. Exposure of school students to cutting age technology in AU campus and talent hunt drive on different occasions. 3. Opportunities for agriculture education in the country and abroad and the facilities available compared to other technical education system. 4. Scope for higher education, training and placement with appropriate financial gain along with social status achieved. 5. Examples to be quoted for success stories and achievers in the field of agriculture. 6. Entire project is targeted to attract talented students for application of RS & GIS in the Agriculture field.
14	**Overall Expected outcome/output from CAAST in next 4 years (Measurable indicators)**	**Expected output** • 1000 students/ field personnel and faculty from different SAUs will be benefitted in training courses. • Awareness programmes of small duration will make 2000 participants aware of RS & GIS applications to agriculture. • 18 trainings of 4 weeks for students and other SAUs personnel, 6 training for officers and nine awareness programs. • 18 visit of career counsellors. • Two seminars at national level during project duration. • 10 percent of students trained shall opt for RS & GIS field for their higher education. • Knowledge enrichment of at least 80 % participants of a batch by 50 % enhancement in score of pre and post test. • Total 40 theses will be submitted on research projects leading to award of 30 PG and 10 Ph.D. degrees. • At least 20 faculties shall be upgraded for application of geo spatial technology in various fields in Agriculture and Agricultural Engineering.

		• Improvement in Faculty effectiveness by 10 percent per year which will be reflected in h-index of VV. • Development of at-least 10 *user friendly products* in form of maps and apps etc. for using geo- spatial technology for agriculture and allied sectors. **Expected out come** • Skilled persons with capability of using RS data for sustainable agricultural development • A developed centre of advance agricultural science and Technology for providing central facility to use geo-spatial data for management of NRM • Wide scale adaptation of geo spatial data by young professionals for decision making at field level in agriculture and allied sectors.

15 Financial Requirement

The colleges of the university are accredited in the ICAR and ready to work hand-in hand on the work area proposed. University has already, but would need financial assistance to carry out regular training and short courses with updated version of software and hardware with adequate number of terminals for which financial requirement of Rs. 1913.00 lakh is required.

The financial requirement of the CAAST Project assessed considering following points.

Research and teaching equipment (i.e. goods), Faculty and scientist development fellowships, Student scholarships, primarily at the postgraduate level, Costs associated with twinning arrangements with similar centres both outside and within India for collaboration, Faculty up gradation through international & national training, Costs for Adjunct/Visiting professors & for lecture series/special lectures.

Financial provisions

Particulars	**1st Year (2019-20)**	**2nd Year (2020-21)**	**3rd Year (2021-22)**	**4th Year (2022-23)**	**Grand Total**
	(Amount in lakh)				
A. Goods & equipment	0.00	235.50	379.00	4.00	618.50
B. Civil Works	20.00	20.00	50.00	0.00	90.00
C. Human Capacity Building	1.5	61.5	76.00	8.00	147.00
D. Consultancy	0.00	25.00	25.00	0.00	50.00
E. Recurrent Cost	68.50	197.50	427.50	314.00	1007.50
Total (A+ B + C+D+E)	**90.00**	**539.50**	**957.50**	**326.00**	**1913.00**

16	**Details plan for environmental and socio-economic safeguard**	The activities proposed for the project ensures the compliance of EMF as

	a. **Environmental Management Framework (EMF):** To create awareness among institution to take actions related to environment management ensuring compliance with the requirement of EMF b. **Equity Action Plan (EAP):** To ensure that all student and faculty have equal opportunity to avail the benefits of the project and to improve performance of weak students which includes SC/ST/OBC and academically weak students **(**University has to ensure that there is no adverse environmental and social impact as a consequence of NAHEP implementation and that the activities under NAHEP are socially acceptable and environmentally sustainable. Details of EMF and EAP are available in ICAR web site**)**	• No activities in the exclusion list (given below) are part of CAAST grants. • Activity will not have any negative impact on surrounding environment - land, water, biodiversity, etc. • Sustainability concerns integrated into the education, research activity proposed • Ability of the project to deliver knowledge on environmental sustainability is high • Stimulates the scientific creativity, research capacity on issues of environmental importance • Agreements in place on safeguards measures with private partners who join the project and beyond either through PPP or as bilateral partners in research, teaching, marketing and/or construction etc. **<u>Exclusion list</u>** • Pesticides classified as class 1a,1b and II are not permitted under any project interventions • Partnership with foreign universities/private firms will not involve exchange of any bio resources (genetic material) without due notice to and permissions from National Biodiversity Authority • Research with genetically engineered organisms is not permitted without approval of GEAC • For construction works, no trees will be cut without permission from relevant departments • No bore wells will be drilled without permissions • No child labour will be hired for any construction activities 1. JNKVV has reservation of students and faculty as 15% belonging to Schedule Castes (SC), 21% to Schedule Tribes (ST), 27% to Other Backward Classes (OBC) and 10 %

		to economically weaker sections(EWS) (as per govt rules). Therefore student enrolled and faculty working in VV have equal opportunity to avail the benefits of the project. Special efforts are made to improve performance of weak students which includes SC/ST/OBC and economically and academically weak students. This ensures equality of all section of society. 2. No construction activities such as establishment/ up-gradation for higher education facilities such as classrooms, library buildings, etc. as major civil within the existing premises of JNKVV, is required except certain modification for RS and GIS laboratory, lecture rooms of temporary nature. 3. No civil work involving compulsory land acquisition or involuntary resettlement is involved. 4. The proposed programme shall fulfil requirements of OP 4.10 of gender equality as JNKVV has 33% reservation for female candidates as social inclusion in view of the needs of the Scheduled Tribe and the Scheduled Caste students as well general category. It will (i) Improve the learning efficiency, skill-sets of the students, including those from socially and economically vulnerable groups including ST and SC by giving them opportunity to learn modern science of remote sensing. (ii) Support faculty to improve their knowledge levels in remotely data acquisition and use, pedagogical skills, and sensitivity to gender equality. (iii) Encourage excellence to organize annual technology innovation

		forums like special lectures, state and national workshops/ conferences/seminars to enable students from various colleges share experiences and innovations. (iv) Promote mentorship amongst students and teachers with collaboration of pioneer institutes of the nation. (v) Support research scholars as a part of CAAST (vi) Provide special attention to academically weak students by attending them with extra care and time.

Annexure - I

Financial requirement of sub-project

Project title: - "Skill Development to Use Spatial Data for Natural Resources Management in Agriculture"

University name: - JNKVV, Jabalpur

	Particulars	1st Year (2019-20)	2nd Year (2020-21)	3rd Year (2021-22)	4th Year (2022 - 23)	Grand total
			(Amount in lakh)			
A	**Goods & Equipment**					
	Equipment, Plant & Machinery	0.00	90.00	175.00	0.00	265.00
	Office Equipment	0.00	4.50	2.00	0.00	6.50
	Laboratory equipment	0.00	120.00	175.00	0.00	295.00
	Furniture & Fixtures	0.00	9.00	13.00	0.00	22.00
	Computer & Peripheral	0.00	8.00	10.00	0.00	18.00
	Books & journal	0.00	4.00	4.00	4.00	12.00
	Sub-total (A)	**0.00**	**235.50**	**379.00**	**4.00**	**618.50**
B	**Civil Works**					
	Minor repair & renovation work	20.00	20.00	50.00	0.00	90.00
	Sub-total (B)	**20.00**	**20.00**	**50.00**	**0.00**	**90.00**
C	**Human Capacity Building**					
	National Level Training	0.00	15.00	7.00	0.00	22.00
	International Level Training	0.00	40.00	60.00	0.00	100.00
	Short visits/seminars	0.00	5.00	5.00	5.00	15.00
	Meeting & workshops	1.50	1.50	4.00	3.00	10.00
	Sub-total (C)	**1.50**	**61.50**	**76.00**	**8.00**	**147.00**
D	**Consultancy**					
	National Level Consultancies	0.00	25.00	25.00	0.00	50.00
	Sub-total (D)	**0.00**	**25.00**	**25.00**	**0.00**	**50.00**
E	**Recurrent Cost**					
	Travel Expenses	0.00	6.00	5.00	4.00	15.00
	Contractual Services	33.50	56.50	100.00	90.00	280.00
	Operational Cost	35.00	115.00	300.00	200.00	650.00
	Institutional Charges	0.00	20.00	22.5	20.00	62.50
	Sub-total (E)	**68.50**	**197.50**	**427.5**	**314.00**	**1007.50**
	Grand Total (A+B+C+D+E)	**90.00**	**539.50**	**957.50**	**326.00**	**1913.00**

Note: Expenditure on student related activities and hiring/ Inviting expert/ Adjunct professor reflected in project proposal may be met out from operational cost.

(Dr. R.K. Nema)
Dean Faculty of Agricultural Engineering and
Nodal Officer CAE, JNKVV, Jabalpur- 482004

Annexure - II

Contractual Services

Item	Numbers
Research Associate	7
Senior Research Fellow	5
Young Professionals YP I & II	6
Skilled Person	-
Unskilled labour	4

Annexure – III

List of Equipment, Plant and Machinery & Laboratory equipment with accessories

A. **Equipment, plant & Machinery**	**Nos.**	**Total (Lakh)**	**Justification**
Sepctro-radiometer (350 – 1100nm)	2	20.00	For conducting practical to make trainees understand the spectral behavior of natural targets – corps, soils, water, etc. Used for collection of reflectance from different land uses and vegetation. This is required for diagnostic analysis of crop conditions and yield assessment.
Hyper Spectral Radiometer (350-2500nm) along with accessories	2	120.00	For monitoring environmental stress to assess agricultural vegetation condition as ground remote sensing experiments are necessary to evaluate the possibility of hyper spectral reflectance spectroscopy this facilitate the studies for identification of spectral window for different applications.
Drone with multispectral sensor and application equipments	1	20.00	To create high quality 3D maps using multi spectral cameras and laser scanners on field basis for precision farming.
Thermal Imaging Camera	1	15.00	Required for doing practical and research on use of thermal remote sensing for crop stress and soil water management
Work Station	20	40.00	To handle heavy data as satellite image data and its analysis for processing /modeling/product development. For PG and PhD students and team members to work on research objective.
Server with software	2	10.00	To store, process and serve for multi terminals during training programme.
Network Attached Storage (100 – 150 TB)	1	10.00	Required for storage of images and data analysis across different labs and users.
Stereo head phones, microphones, Patch Bay, Head phone distribution amplifier, digital portable recorder, sound proofing and control room for audio visual recording and webcasting of programmes.	1	30.00	To disseminate skilled technical knowledge to various stake holders in real time at different campus through outreach program. To save time, energy and money of the beneficiaries as well as resource person.
Total (A)		**265.00**	

B. Office Equipment	**Nos.**	**Total (Lakh)**	**Justification**
Wall mounted smart LED display TV meeting room	1	1.50	For display of training material during the trainings to trainees and trainers.
Public address system	2	1.00	For sufficient audio sound during training for on or off campus.
Multifunctional Photocopier machine	2	4.00	For multiple copies for training materials.
Total (B)		**6.50**	
C. Laboratory Equipment	**Nos.**	**Total (Lakh)**	**Justification**
Geo-Positioning Systems	15	4.50	To locate/position of object on earth surface. To verify the object as classified on the satellite image during capacity building programme for mapping of ground data into digital format.
Hand held crop nitrogen sensor	8	8.00	To assess nitrogen content in the crop for specifying the amount of nitrogenous fertilizer application rate.
Large Format Plotter A0 Size	1	10.00	To print high quality large size maps.
Drone Image Processing Software Pix4D	1	10.00	Required for preprocessing of drone images collected from sensors for use in different applications
Software ArcGIS (45 user), ERDAS (50 User with three year license) Imagine, MIKE SHE(Multiuser), Visual MODFLOW (3D) (Multiuser), MATLAB, Crop growth modeling s/w, etc.	-	50.00	For Satellite image processing and GIS operations. For modeling in the field of ground water, crop growth and big data analysis.
Geoserver software for windows with web server	1	60.00	To develop web based geo portal for development of web applications
High Power Computing (HPC) system	1	50.00	Required for extracting information precisely from the huge data especially for big data analysis. High-performance computing (HPC) is the ability to process data and perform complex calculations at high speeds.
Digital Terminals	50	20.00	Terminals connected with the server to be used by individuals in training for learning and practicing the technology and its application.

A0 Scanner	1	10.00	To scan large size maps. As large size map scanning is required for making the maps in digital format for further processing in GIS.
Equipment for LAN/Wifi networking	-	10.00	Connectivity of all terminals to a common network to server as well as internet connectivity.
Interactive LED Display with Digital Podium 8X6 feet 120”diagonal	2	10.00	For presentation during trainings, project meeting, student seminar etc.
Camera 45 mega Pixel with Zooming facility and all accessories.	4	4.00	To take high quality photographs and to make video recording of project activities.
CCTV with 20 cameras with control unit	1	1.50	For Surveillance in and around training unit, laboratory and office.
Air Conditioner	6	3.00	For comfortable working of human and technical resources and making dust free atmosphere in the Lab.
Chlorophyll SPAD meter	5	10.00	To monitor the crop greenness and use it for decision making.
Line Quantum PAR sensor with logger	2	4.00	To measure Photosyntheitically Active Radiation (PAR) required for crop growth modeling.
Soil moisture meter with 50 sensors	1	7.00	Soil moisture monitoring for enhancing water use efficiency in field.
Off Line UPS 10 KVA	5	5.00	For maintaining uninterrupted power supply to training unit.
Canopy analyzer	1	6.00	To measure in-situ leaf area in field to relate it with images derived vegetation indices required for crop growth modeling and environmental impact studies.
Digital planimeter and chartometre	30	12.00	Required for area and length measurement on maps
Total (C)		**295.00**	
D. Furniture and fixtures	No	**Total**	**Justification**
Book Selves	10	1.00	For safety of books.
Steel Rake	6	0.50	To accommodate records.
Lab Stool	10	0.50	For office assistants.
Table and Chairs for Executives	10	4.00	For PI and Nodal Officer.
Steel Almirah	6	1.20	For keeping records and document.
Computer Table and Chairs	50	8.00	For practical class of trainees.

File cabinet	4	1.00	Placing of files.
Compactor	1	2.00	For safe custody of official document including financial file.
Side table with drawer	5	1.00	For office assistants.
Furnishing items	-	2.80	For office assistants.
Total (D)		**22.00**	
E. Computer & Peripheral	**Nos.**	**Total (Lakh)**	**Justification**
Desktop computer	10	11.00	For efficient and technical work of SRF/RA/Co-PI/Associate Scientist. For preparation of reports, fast processing of information, Scientific knowledge,
Black & White and colour Printers	-	2.50	
Portable Hard Disks and other Storage Deveices amd Wifi modem with internet	20	2.00	
Photo scanner	2	0.50	
Other peripherals	-	2.00	
Total (E)		**18.00**	
F. Books & journal	**Nos.**	**Total (Lakh)**	**Justification**
Books			
Fundamentals of Remote Sensing by George Joseph & C Jeganathan (3rd Ed)	4		Books on basic and applied aspects of Remote Sensing applications in Agriculture and allied sectors shall be useful for working on different discipline required to be applied for betterment of natural resource management particularly in agriculture and for the benefit of farmers and farming sectors. The books to be used by research scholars, scientists, teachers and, the trainers and trainees during the project work.
Remote Sensing and Image Interpretation by Lillesand, Kiefer, Chipman	2		
GIS and natural resource management	2		
Geo spatial application for natural resource management by Chandel Kumar Singh	2		
Satellite Remote Sensing and Management of Natural Resources	2		
Sustainable Natural Resource Management by Alfred and Muller	2		

RS and GIS based Resource Management			
Text book of RS and GIS by Kalicharan Sahu	2		
Remote Sensing Technique of Agriculture by G.D. Sahu and R.M. Solanki	2		
Basic Principals of RS & GIS by B.C. Panda	2		
Fundamental of GIS by Devnath Chakraborty	2		
Application of RS in Agriculture by M.D. Steven and J.A. Clark	2		
Hyper spectral RS of Vegetation	2		
UAV or Drones for RS applications			
Q GIS and application in Agriculture and Forest	2		
Change analysis of watershed using RS applications	2		
RS technique in Agriculture	2		
Precision farming by M.G. Sharma	2		
RS and GIS application for side specific in Agriculture	2		
Statistical data books for different aspects	2		
Subscription for Journals			
Online access for data in natural resources	1		The national and international journals on remote sensing and GIS applications are required to update the latest information and technologies being developed at different advanced centers. The journals are also helpful for learning the
Journal of Applied remote sensing	1		

Journal of remote sensing	1		cutting edge technology in related disciplines use by workers and its applications into field work. This is essential for high quality research work compatible at global level and it enhances the quality of education at institute level.
Journal of photogrammetric and remote sensing	1		
International Journal of advanced remote sensing	1		
International Journal of remote sensing	1		
Journal of the Indian Society of Remote Sensing	1		
Geospatial information science	1		
Geomorphology	1		
Spatial issue on hyper spectral remote sensing	1		
Remote sensing of vegetation	1		
Remote sensing letters	1		
Remote sensing of environments	1		
Remote sensing	1		
Total		**12.00**	
Grand Total (A+B+C+D+E+F)		**618.50**	

Annexure IV

Details of renovation/repair work under civil work

Details of renovation/repair work	**Proposed fund**
• For development of Computer lab and training hall by false ceiling, wall paneling, Aluminum partitioning, Ventilation, vinyl flooring.	**90.00**
• Formation of cubical for RA/SRF/Associate Scientists.	
• Electrification of Computer lab.	
• Alternate power supply using generator set and inverter for smooth running of work during power failure.	

Annexure V

Particulars of training and workshop with break up budget based on the main financial budget and commitment of training, workshop, short course, visit in the final project proposal

Human Resource Development

Particulars	1st Year (2019-20)	2nd year (2021-22)				3rd year (2021-22)				4th Year (2022-23)	Fund allotted (Rs in Lakhs)
		Nos.	Name of Institute/University	NIL	Area identified	Nos.	Name of Institute/University	Targeted group	Area identified		
National Training	NIL	11	• IARI, New Delhi • IIRS, Dehardun • MPCOST, Bhopal • ISRO, Hyderabad • SAC, Ahmedabad • IIT, Bombay • IIT, Roorkee	Faculty	• To develop proficiency in the remote sensing and GIS application for related fields. • Advanced technologies for application of RS & GIS • Products development and apps for dissemination of technology to stake holders.	12	• IARI, New Delhi • IIRS, Dehardun • MPCOST, Bhopal • ISRO, Hyderabad • SAC, Ahmedabad • IIT, Bombay • IIT, Roorkee	Faculty	• To develop proficiency in the remote sensing and GIS application for related fields. • Advanced technologies for application of RS & GIS • Products development and apps for dissemination of technology to stake holders.	NIL	22.00

International Level Training	NIL	10	• Asian Institute of Technology, Geoinformatics Center, Thailand/ • New Maxico State University, onsumer and Environmental Sciences New Maxico/ • Centre for Remote Imaging, Sensing And Processing National University of Singapore/ • University of Zadar, Croatia, Southeast Europe • Royal Melbourne Institute of Technology, , Melbourne, Australia/ • ITC Faculty Geo-Information Science and Earth Observation, Netherlands	**Faculty**	• Remote Sensing application in hazard risk assessment as well as Drone and Drone based technology. • Role of Spatial and temporal heterogeneity of soil properties on plot and field scale under different ecosystem and Carbon Sequestration in soils • Processing of Hyper spectral Data and its application in Agriculture • Application of Big Data Analysis in NRM and Agriculture RS & GIS Applications for sustainable Agriculture	13	• Asian Institute of Technology, Geoinformatics Center, Thailand/ • New Maxico State University, onsumer and Environmental Sciences New Maxico/ • Centre for Remote Imaging, Sensing And Processing National University of Singapore/ • University of Zadar, Croatia, Southeast Europe • Royal Melbourne Institute of Technology, , Melbourne, Australia/ • ITC Faculty Geo-Information Science and Earth Observation, Netherlands	**Faculty**	• Remote Sensing application in hazard risk assessment as well as Drone and Drone based technology. • Role of Spatial and temporal heterogeneity of soil properties on plot and field scale under different ecosystem and Carbon Sequestration in soils • Processing of Hyper spectral Data and its application in Agriculture • Application of Big Data Analysis in NRM and Agriculture RS & GIS Applications for sustainable Agriculture	**NIL**	**100**

Short Visits / Seminars	NIL	10	• IARI, New Delhi • IIRS, Dehardun • ISRO, Hyderabad • SAC, Ahmedabad • IIT, Bombay • MPCOST, Bhopal • IIT, Roorkee	Faculty	• Remote sensing applications in different areas viz. Climate change, drought analysis, hyperspectral remote sensing in identification of crop stress. • Application of Geospatial technology in hydrological modelling, climate change studies and irrigation water management. • Watershed modelling, water flow simulation, integrated river basin management, forest hydrology using remote sensing and GIS application. • Spatial temporal data mining, microwave	10	• IARI, New Delhi • IIRS, Dehardun • ISRO, Hyderabad • SAC, Ahmedabad • IIT, Bombay • MPCOST, Bhopal • IIT, Roorkee	Faculty	• Remote sensing applications in different areas viz. Climate change, drought analysis, hyperspectral remote sensing in identification of crop stress. • Application of Geospatial technology in hydrological modelling, climate change studies and irrigation water management. • Watershed modelling, water flow simulation, integrated river basin	10	• IARI, New Delhi • IIRS, Dehardun • ISRO, Hyderabad • SAC, Ahmedabad • IIT, Bombay • MPCOST, Bhopal • IIT, Roorkee	Faculty	• Remote sensing applications in different areas viz. Climate change, drought analysis, hyperspectral remote sensing in identification of crop stress. • Application of Geospatial technology in hydrological modelling, climate change studies and irrigation water management. • Watershed modelling, water flow simulation, integrated	**15.00**

					remote sensing, multi sensor satellite remote sensing data application for crop monitoring and forecasting. • Bioenergy, bio processing, downstream processing, food processing, paper and pulp engineering • Remote sensing and GIS application in crop modelling. • **Watershed hydrology, remote sensing and GIS applications in distributed modelling of rainfall-runoff-soil erosion process.**				management, forest hydrology using remote sensing and GIS application. • Spatial temporal data mining, microwave remote sensing, multi sensor satellite remote sensing data application for crop monitoring and forecasting. • Bioenergy, bio processing, downstream processing, food processing, paper and pulp engineering • Remote sensing and GIS application in crop modelling. • **Watershed hydrology, remote**				river basin management, forest hydrology using remote sensing and GIS application. • Spatial temporal data mining, microwave remote sensing, multi sensor satellite remote sensing data application for crop monitoring and forecasting. • Bioenergy, bio processing, downstream processing, food processing, paper and pulp engineering • Remote sensing and GIS application in crop modelling. • **Watershed hydrology,**	

									sensing and GIS applications in distributed modelling of rainfall-runoff-soil erosion process.				**remote sensing and GIS applications in distributed modelling of rainfall-runoff-soil erosion process.**	
Meetings & Workshop	1	2	JNKVV, Jabalpur	Faculty, students and NAHEP team with invited experts and other stakeholders	• Reviewing progress of the project • Latest technology in the field. • Updating the team working under NAHEP. • Showcasing the work done and suggestion for improvement. • Knowledge sharing with the students.	2	JNKVV, Jabalpur	Faculty, Students and NAHEP Team with invited experts and other stakeholders	• Reviewing progress of the project • Latest technology in the field. • Updating the team working under NAHEP. • Showcasing the work done and suggestion for improvement. • Knowledge sharing with the students.	2	JNKVV, Jabalpur	Faculty, Students and NAHEP Team with invited experts and other stakeholders	• Reviewing progress of the project • Latest technology in the field. • Updating the team working under NAHEP. • Showcasing the work done and suggestion for improvement. • Knowledge sharing with the students.	10.00
Grand Total (A+B+C+D) = 147.00 lakhs														

Annexure VI

Equity Action Plan:

Name of the University : Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur M.P.
Nodal Officer (EAP) Name : Dr. Deepak Rathi, Senior Scientist
Mail id : drathi@rediffmail.com
Phone No. : 9424601211

S. No	Item	Actions	Implementation Agency	Frequency	Monitoring Indicators	Resources Required (budget,

						technical support etc.)
1.	To identify means to attract students to higher agriculture education	Admissions as per MP government reservation policy. Arranging awareness program for students to acquaint newer technology like Remote Sensing and Geographical Information System and its application in management of soil, water, crop and related field.	The JNKVV and CAAST implementing Team Awareness program in school and colleges and stipend candidates working in the theme of the project shall attract youth to Agriculture Education. Student Assistantship as permitted with in NAHEP frame work for selected PG/PhD students.	Annually	Following State government norms for reservation in admission to SC (15%), ST(21%), OBC (27%), EWS(10%) and 33% for female students. Student Assistantship for 6 PG and 6 Ph.D. students working with the theme of the project.	Rs. 4.00 lakh will be met from operational cost.
2.	To identify weaknesses in all students and take remedial steps	Self assessment tests shall be conducted before each awareness program. The identified weakness shall be solved through extra classes and attention during classes.	CAAST implementing Team	Before and After completion of each course	The existing all subjects pass students are 70% which is expected to increase up to 80%.	Rs. 0.5 lakh will be met from operational cost.
3.	To improve language competency, soft skills and confidence levels	Special linguistic classes shall be arranged. Inclusion of courses on communication skill and personality development. One month course for 60 students per year.	JNKVV through College of Agricultural Engineering with the help of professional agencies	During one of the semester of PG and Ph.D. students	The existing all subjects pass students are 70% which is expected to increase up to 80%.	Rs. 2.00 lakh will be met from operational cost.
4.	Give young faculty priority in opportunities	The proposed CAAST aims to develop skills of faculties in specific domain of	CAAST Implementing Team	Number of bimonthly, half yearly and annual	Two research papers/faculty shall be produced.	Will be met from operational cost.

	to upgrade their domain knowledge	Natural Resource Management, plant science and big data analysis		skill development programmes		
5.	Training of faculty in subject matter and pedagogy, particularly to improve the performance of weak students	Most of the SAUs including ours run courses on RS and GIS in UG/PG/PhD programmes and this project shall provide adequate capacity building as mentioned in objective 1 item 4 of the CAAST project proposal. 90 faculties will be trained @ 30 trainees per/year/training.	CAAST Implementing Team	4 weeks training twice in a year	Two research papers/faculty shall be produced.	Rs. 2.20 lakh will be met from operational cost.
6.	Make campuses physically and socially gender friendly, especially provide adequate and suitable facilities to women students and faculty	JNKVV has enough and separate facilities to accommodate girl students, separate toilets with napkin vendors and incinerators are provided. All buildings of the university has got "ramps" to facilitate easy mobility of "Divyangs"	CAAST Implementing Team	Already have adequate	Has separate and adequate girls hostels with modern amenities	No extra budget required.
7.	Hold innovation and Knowledge sharing workshops yearly to improve knowledge sharing	On theme of NRM, Plant Science and crop improvement periodic courses shall be arranged throughout the project period. Out of total 120 students 15-20 PG and PhD students shall be given opportunities to cater their research work in national and international twinning programmes. For selection of students for National and overseas training, the guidelines of reservations of GoMP and ICAR shall be followed.	CAAST Implementing Team	Bimonthly , six monthly and annual	10 skill development programmes of different durations in a year. Two national/international training/placement per year	Rs. 20.00 lakh will be met from operational cost.

8.	A three tier grievance redress mechanism (GRM)	The separate grievance boxes will be provided for all units of the campus where NAHEP will be implemented. Adequate notices will be displayed at 16 places including Administrative block, College, 8 boys' hostels and 6 girls hostel.	JNKVV and College of Agricultural Engineering	Continuous	Cell members, email address and location of Grievance Redressal cell shall continuously be made easily available to concerned No grievance among students	Rs. 0.5 lakh will be met from operational cost.
9.	Peer Learning Groups of students	About 10 Peer Learning Groups of Students shall be formed comprises of meritorious and weaker students. They will perform their research activities and field works jointly on cooperative and complementary basis.	JNKVV, CAE and CAAST implementing team	Continuous	Formation of groups of students on the basis of specialization under worthy supervisors. 10 such groups of maximum 15 students per group on NRM, Plant science and Plant protection shall be formed and carry studies.	Rs. 5.00 lakh will be met from operational cost.
10.	Appointing Student Mentors and Faculty Advisors for students	The university already has system of class advisors and student advisors	JNKVV and CAE	Continuous	One class advisor for each batch of student and one student advisor for research purpose at PG and Ph.D. level.	No extra fund required.
11.	**Labour Management Plan**	**Civil Work under NAHEP** Ensuring the following in tender document • Labour license for the requisite number of labourers deployed in a project. A copy of labour license must be supplied to PI by contractor	JNKVV and CAE	Continuous	Regular monitoring by Nodal Officer with 100 percent satisfaction to worker.	Rs. 1.00 lakh will be met from operational cost.

		• Insurance for its labour so as to ensure that adequate financial provisions are available in case of any injuries during the accident or emergency • Equal wages for men and women workers • Child labour free zone • Potable water, cooking and storage facilities • Caution boards will be displayed at construction zones especially where habitation is nearby to aware public. Information / caution boards will also be displayed in construction / labour camp and storage sites • Counselling and regular awareness of labour and contractors over construction safety issues.				
					Total	**35.20***

*Total Rs. 35.20 lakh will be met from operational cost.

Signature and Seal of the PI

Signature and Seal of the Nodal Officer (EAP)

Environmental Sustainability Plan (ESP)

PROJECT TITLE (National Agricultural Higher Education project)

Component 1b: Centre for Advanced Agricultural Science and Technology (CAAST) on

SKILL DEVELOPMENT TO USE SPATIAL DATA FOR NATURAL RESOURCES MANAGEMENT IN AGRICULTURE AT JNKVV Jabalpur M.P.

Name of the University : Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur M.P.
Nodal Officer (EAP) Name : Dr. S. B Das Professor
Mail id : shoumitrad@yahoo.com
Phone No. : 9425087014

Environmental Safety Plan (ESP)

S. No.	Proposed Interventions/ Activities	Compliances applicable	Possible Environmental Impact	Mitigation Measures	Scope for the integration of best practices of Environmental	Resources Required (budget, technical support etc.)

					Sustainability concerns	
1	Civil Works- Renovation of processing plants/ laboratories	Municipal Solid Wastes (Management and Handling) Rules, 2000 • Construction & Demolition Waste Management Rules, 2016 notification.	Generation of the debris	Debris will be put to alternate use such as land filling in consultation with Local Bodies (Municipal Authority or Pollution Control Board) Constructional operations will ensure the following measures • The operations like mixing raw material will be done in areas of less people's movement. Construction equipment that emits noise will not be used in residential areas during night • The workers will be provided with gloves, masks, helmets etc.	Integration of best practices ensured as all institutions have sufficient land area.	Rupees 2.50 Lakh (will be met from cost under civil work)

				• Use of child labour will be avoided • All these points will be reflected in the agreement with the contractor.		
		Noise Pollution (Regulation & control) Rules, 2000	Issue of construction noise.	Ensuring constriction equipment that use less noise in residential area during night or hospitals. The noise level in any area/ zone shall not exceed the ambient air quality standards in respects to noise as specific in the schedules.	Less noisy equipment can be insisted.	Rupees 1.50 Lakh (will be met from cost under civil work)
		The National Building code of India (NBC)	Public safety issues.	Safety of the public will be ensured with regard to structural sufficiency, fire hazards and health aspects of buildings.	Will follow the NBC provisions in design Use of Quality/ environmentally safe raw materials.	
		Energy Conservation Building Code (Energy	Use of illegally mined or low quality materials will	ECBC sets minimum energy standards for commercial buildings having a connected load	Energy saving/ efficient equipment will be procured and energy standard be maintained	

		Conservation Act. 2002)	affect the environment and the infrastructure quality. Existing lighting system is energy intensive Power supply is erratic Lack of fire safety measures and awareness	of 100kW or contract demand of 120 KVA and above		
2	Plant Protection activities	Insecticide Act, 1968	Procurement, stocking or exhibition or distribution of any insecticide is not envisaged in the proposal, if at all required.	• Purchase will be made only from licensed shops. Only Pesticides permissible under WHO classification will be used.	Use of bio control agents, bio--pesticide will promoted. Awareness on pesticide, safe use in relevant training.	Rupees 2.00 Lakh (will be met from operational cost)
3	Office processing units, Computer peripherals and laboratory maintenance	**E-Waste (Management and Handling) Rules, 2018:**	Radiation and Heavy metal contamination of ground water / soil	• E-Waste will be channelized through collection center or dealer of authorized producer		No additional cost required.

				or dismantler or recycler or through the designated take back service provider of the producer. • Will maintain records of e-waste generated by them in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board;		
					Total	**Rs. 6.00 lakh**

Note: Expenditure on ESP related activities will be met from civil work/Operational Cost whichever is applicable.

Signature of Principal Investigator
Date

Signature of Nodal Officer
Date

PAD indicators values related to NAHEP-CAAST Project								
PROJECT TITLE (National Agricultural Higher Education project) **Component 1b: Centre for Advanced Agricultural Science and Technology (CAAST) on** **SKILL DEVELOPMENT TO USE SPATIAL DATA FOR NATURAL RESOURCES MANAGEMENT IN AGRICULTURE**								
OUTCOME 1	**PDO indicators**			**Targeted value**				
Better employment and entrepreneurship opportunities created with coordinated development of teaching, research and extension on emerging areas of agriculture	**PDO CAAST 1**	**Effectiveness of indicators**	**Base Year**	YR1	YR2	YR3	YR 4	**Description (indicator definition etc.)**
	% increase in number of technologies commercialised	5% per year	7	7	7	8	8	Measured in % increase
	PDO CAAST 2							**Description (indicator definition etc.)**
	% increase in faculty research effectiveness	2% per year	24	24	24	25	25	Faculty research effectiveness, measured by h-index (The h-index of a university is the largest number h such that at least h articles from that university were cited at least h times each)
OUTPUT 1	**Intermediate level indicators**							

Improved faculty research effectiveness with better industry and market orientation	**IR CAAST 1**							**Description (indicator definition etc.)**
	Number of technologies transferred to industry / private sector / national / international organisations	2 number per year	13	13	15	17	19	Measured in number
OUTPUT 2	**Intermediate level indicators**							
	IR CAAST 2							**Description (indicator definition etc.)**
Enhanced teaching quality, faculty strength and competence	% increase in JRF / SRF / ARS/ GATE	5% per year or 4 students per year	80	80	83	87	90	Measured in % increase of number of students selected in JRF / SRF / ARS / GATE
	IR CAAST 3							**Description (indicator definition etc.)**
	% increase in number of students who were admitted in foreign universities	10% per year or 1 student per year	2	2	2	3	4	Measured in % increase of number of students admitted in foreign universities
OUTPUT 3	**Intermediate level indicators**							
	IR CAAST 4							**Description (indicator definition etc.)**

Improved student effectiveness through increased placements, rewards and recognitions	% increase in PG student placements	10% per year or 2 student per year	20	20	20	22	24	% PG students placed out of total graduating PG class strength
	IR CAAST 5							**Description (indicator definition etc.)**
	% increase in PG student placements (male)	10% per year or 1 student per year	12	12	12	13	15	% PG students placed out of total graduating PG class strength (male)
	IR CAAST 6							**Description (indicator definition etc.)**
	% increase in PG student placements (female)	10% per year or 1 student per year	8	8	8	9	9	% PG students placed out of total graduating PG class strength (female)
	IR CAAST 7							**Description (indicator definition etc.)**
	% increase in PG student placements (SC/ST)	5% per year or 1 student per year	3	3	3	4	4	% PG students placed out of total graduating PG class strength (SC/ST)
	IR CAAST 8							**Description (indicator definition etc.)**

	% increase in students received National Young Scientist Award	5% per year or atleast one in three years	0	0	0	0	1	Measured in % increase
	IR CAAST 9							**Description (indicator definition etc.)**
	% increase in students received ICAR's Jawaharlal Nehru thesis Award,	5% per year or atleast one student in three years	0	0	0	0	1	Measured in % increase
	IR CAAST 10							**Description (indicator definition etc.)**
	% increase in students awarded at Agri-unifest	10% or one student per year	6	6	7	8	9	Measured in % increase
	IR CAAST 11							**Description (indicator definition etc.)**
	% increase in students awarded at Agri uni sports meet	5% are atleast one student in three years	0	0	0	0	1	Measured in % increase
OUTPUT 4	**Intermediate level indicators**							

	IR CAAST 12							**Description (indicator definition etc.)**
Improved organisational excellence of AUs translating to ready prospects for funding and knowledge exchange	Number of industry-sponsored projects and positions in cutting-edge areas of agri-science	1 number in each year	2	2	2	3	4	Measured in number
	IR CAAST 13							**Description (indicator definition etc.)**
	% increase in number of competitive grants from a national/international funding agency	10% are one per year	10	10	10	11	12	Measured in % increase
	IR CAAST 14							**Description (indicator definition etc.)**
	Number of faculty exchange programmes (both national and international) initiated by AU	1 number per year	0	0	0	1	2	Number of faculty exchange programmes (both national and international) initiated by AU
	IR CAAST 15							**Description (indicator definition etc.)**
	Number of student exchange programmes (both national and international) initiated by AU	1 number per year	0	0	1	2	3	Number of student exchange programmes (both national and international) initiated by AU

Annexure - VIII

List of students selected in various State and Central Government Jobs over last five years

S.N.	Organization	Year wise number of students					Total
		2014-15	2015-16	2016-17	2017-18	2018-19	
1	Educational institutes	9	21	25	35	11	**101**
2	State Departments of Farmers Welfare and Agriculture Development	24	36	56	32	09	**157**
3	ATMA	19	17	21	00	00	**57**
4	State Seed Corporation/FCI	35	31	29	00	10	**105**
5	Seed Certification Agency	0	12	52	00	00	**64**
6	Forest Department	8	14	19	02	00	**43**
7	Directorate of Agricultural Engineering Govt. of M.P.	00	00	03	06	00	**09**
8	State Police	3	0	0	21	00	**24**
9	Banks	00	23	13	00	00	**36**
10	Revenue Department	00	00	00	02	02	**04**
	Total	**98**	**154**	**218**	**98**	**32**	**600**

Awards to students

- **All India Sports and Youth Festival**

Year	Gold	Silver	Bronze
2014-15	Procession March past - 01	2	0
2015-16	Folk Dance / March past - 2	-	Rangoli/Music/ Patriotic - 3
2016-17	-	Group Song India - 1	Solo song/ extempore/ Cartooning - 3
2017-18	First prize and Championship Trophy in Procession event - 1	-	-
2018-19	Championship in Music - 1	-	-

Annexure-IX

List of papers published on application of Remote Sensing and GIS

1. Bhatnagar Devanu, Nema R.K. and Mahapatra, S.N. (2007). A GIS based approach for generation of thematic maps to delineate ground water potential zones. *JNKVV Research Journal*, 41(1) : 95.
2. Bhatnagar Devanu , Nema R.K. and Mahapatra, S.N. (2007). A GIS based approach for delineation of ground water potential zones. *Science Fronts* Vol 1 Dec2007, 135-140.
3. Dubey M and Hardaha MK. (2019). Application of Standard Models and Artificial Neural Network for Missing Rainfall Estimation. International Journal of Current Microbiology and Applied Sciences 8(01):1564-1572
4. Dubey Nitin, Nema R.K., Awasthi M.K. and Tiwari Y.K. (2003). Topographic analysis through digital elevation model for Patan Branch Canal command area using RS & GIS, proceedings of 37th ISAE convention, held at CTAE, Udaipur, 29-31 January, ppl 1-4.
5. Dubey, Nitin, Nema, R.K. and Jain Neeraj (2003) "Sudur Samvedi Ankde: Fasali Chetron ke lie Vardan". Paper presented and published in proceedings of "Rashtriya Snagosthi on jal Sansadhan ke Chetra men Bhavi Chunotiya". held at national Institute of Hydrology, Roorkee, Uttaranchal. 16-17 Dec, 2003 pp 687-694.
6. Gajbhiye, S. and Sharma, S.K. (2012). Land use land cover change detection of Indra river watershed through Remote Sensing using Multi-Temporal satellite data. *International Journal of Geomatics and Geosciences,* Vol 3 No. 1:89-96. **(Citation – 31)**
7. Gajbhiye S and Sharma SK (2015). Application of remote sensing and GIS approach for prioritization of watershed through sediment yield index. International Journal of Science and Innovative Engineering & Technology. Vol (1). (**Citation – 3**)
8. Gajbhiye, S. Sharma, S.K. and Jha, M. (2010). Application of Principal Component Analysis in the assessment of water quality parameters. *Sci-fronts A journal of multiple science.*Vol IV, (4):67-72. (**Citation – 3**)
9. Gajbhiye, S., Sharma, S.K. Meshram, S. (2014). Prioritization of Watershed through Sediment Yield Index Using RS and GIS Approach. *International Journal of u- and e- Service, Science and Technology* Vol. 7, No. 6 (2014), pp. 47-60 http://dx.doi.org/10.14257/ijunesst.2014.7.6.05. **(Citation – 18)**
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List of thesis title on RS and GIS application

S.N.	Name of students	Class	Year	Title	Name of Major Supervisor
1	Shrivastava, Neetesh Kumar	M.Tech.	2002	Use of remote sensing data for identification of seasonal water bodies and preparation of action plan for baghela nala watershed	Rajput, G. S.
2	Nema, Shweta	M.Tech	2005	Water resource planning using geographical information system	R. K. Nema
3	Pramanik, Monalisha	M.Tech.	2006	Quantification of reacharge through haveli fields-a remote sensing and GIS approach	M. K. Awasthi
4	Mohini Ahirwar	M.Tech.	2008	Evaluation of Irrigation Performance Thorought Remote Sensing And Gis	R. K. Nema
5	Tripathi, Mridul Kumar	M.Tech.	2008	Estimation of non point source pollution from agricultural land in satna district using remote sensing and GIS	Hardaha, M.K
6	Seema Suraiya	M.Tech.	2009	Spectral Response of Different Crops at various Growth Stages	R. K. Nema
7	Pratibha Warwade	M.Tech.	2009	Micro-Watershed Analysis Using Remote Sensing and GIS,	Hardaha, M.K

				A-Case Study of Patani Nala Watershed	
8	Ahirwar, Ajay	M.Tech.	2010	Decision support system based on morphometric analysis for prioritization of watershed using RS and GIS techniques	Sharma, S. K.
9	Singh, Satish Kumar	M.Tech.	2011	A study on monitoring field water storage using spectral response	R. K. Nema
10	Rishi Pathak	M.Tech.	2011	Geomorphological Analysis of Watershed Using Rs and GIS Technique	Sharma, S. K.
11	Thakur, Sudhir Kumar	M.Tech.	2011	Spectral response of Rabi crops through handheld ground truth radiometer	R. K. Nema
12	Amar Yadav	M.Tech.	2012	Remote sensing and GIS approach for prioritization of watershed for soil conservation	Sharma, S. K.
13	Rajeev Ranjan	M.Tech.	2013	Saaty's Analytical Hierarchical Process Based Prioritization of Sub-Watersheds of Bina River Basin Using Remote Sensing and GIS	S. K. Gupta
14	Sapna Pandey	M.Tech.	2013	Remote sensing and GIS based assessment of groundwater potential zones of Narsinghpur district in upper Narmada basin	Y. K. Tiwari
15	Bala, Sarita Kiran	M.Tech.	2013	Hypsometric analysis for prioritization on watershed using GIS technique	Sharma, S. K.
16	Jayaram, Patil Rupesh	M.Tech.	2013	Remote sensing and GIS approach for estimation of soil erosion of shaker river watershed	Sharma, S. K.

17	Singh, Gautam	M.Tech.	2014	Reote sensing and GIS approach for estimation of runoff of shakkar river watershed	Dr.S.K.Sharma
18	Sharma, Aribam Priya Mahanta	M.Tech.	2015	Spatial estimation of gross erosion in shakkar river watershed using remote sensing and GIS techniques	Dr.S.K. Sharma
19	Vishwakarma, Praveen kumar	M.Tech.	2015	Prioritization of koha nala watershed for soil conservation treatment	Dr. M.K.Hardaha
20	Bangar, Bhaginath Abhijeet	M.Tech.	2015	Remote sensing and GIS approach for estimation of runoff of bamhani watershed	Dr.S.K.Sharma
21	Jyotsna Saiyam	M.Tech.	2015	A study on ground water table behaviour in sugarcane dominated area	Dr. R.K. Nema
22	Hemant Kumar Kurmi	M.Tech.	2016	Estimatioon of Soil Erosion in Mehgaon Watershed Using Remote Sensing And GIS Techniques	Dr.S.K.Sharma
23	Swati Agrawal	M.Tech.	2017	spatial Estimation of Runoff from Hiran River Catchment Using Remote Sensing and GIS Technique.	Dr. M.K.Hardaha
24	Jgrati Tiwari	M.Tech.	2017	Intigration of Universal soil loss Equation with GIS for Soil Erosion Assessment, A Case Study of Banjar River Watershed.	Dr.S.K.Sharma
25	Aniket Rajput	M.Tech.	2018	Soil Erosion Estimation using Universal Soil Loss Equation and Geographical Information System Integration for Priortization of Banjar River Water Shed	Dr. S.K. Sharma
26	Harshita Vyas	M.Tech.	2018	Assessment of sedimentation in Kharkhara Reservoir Using Remote Sensing and GIS	Dr. S.K. Pyasi

27	Deepak Patle	M.Tech.	2018	Effect of Conservation Structures on Groundwater Recharge in Tikamgarh District, Madhya Pradesh	Dr. P. Sikarwar
28	Er. Prasant Shrivastava	Ph.D.	2009	Land and water Resource Planning of Baghela Nallah Watershed Using GIS	Dr.G.S. Rajput
29	Er.Shaileshkumar Sharma	Ph.D.	2010	Geographological Based Identification of Critical Watershed for Soil Conservation using GIS and Remote Sensing	Dr.N.K.Seth
30	Akhilesh Singh	Ph.D.	2009	Gis Based lrrigation water management in canal command area	Rajput, G. S.
31	Shrivastava, Prashant	Ph.D.	2009	Land and water resource planning of Baghela nallah watershed using GIS	Rajput, G. S.
32	Er.Subhash Thakur	Ph.D.	2016	Hydrologic Response to Land Use /Land Cover Change in Upper Narmada Basin	Dr. Devakant
33	Er Saurabh Nema	Ph.D.	2017	Planning opitmal water utilization using simulation- techniques in tawa command area	Dr. M.K.Awasthi
34	Renu Upadhyay	Ph.D.	2018	Modelling of Groundwater flow in changing crop Scenerio in a part of Upper Narmada Basin	Dr. R.K. Nema,
35	Rishi Pathak	Ph.D.	2018	Strategic Planning for Reacharge Utilization in Changing Climate Scenario	Dr. M.K. Awasthi

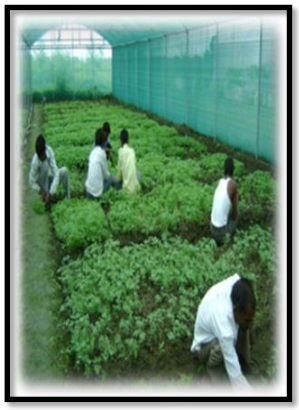
Annexure-X

Salient Achievements under MPWSRP

Madhya Pradesh state which was having productivity of 1710 kg/ha of wheat during 2005-06 was searching a window to speed up the agricultural growth, in the same period World Bank launched MPWSRP and the opportunity was grabbed by State Govt. The agriculture extension system got strengthened due to addition of almost all KVKs and research centres under JNKVV and Later on JNKVV and RVSKVV.

With the support of the technology available a tremendous awareness could be created in the farmers which were converted to an efficient production system with the generous support of Water Resources Department (WRD) and MPWSRP through World Bank.

- Total 78 Thematic maps on land use, water bodies and other agriculture activities prepared for Tons and Sindh Basin on GIS platform covering area of 3.99 M ha.
- Demonstration unit of different irrigation methods and plant nursery were established for the promotion of vegetables and horticulture through Net house, Poly house. Demonstrational unit of drip and sprinklers were established at three centers namely RARS Rewa, RARS Sagar and ZARS Tikamgarh.
- Fruit and plant nursery are developed and different varieties were produced and distributed to farmers.
- 90 Trainings to 1250 departmental officers on different subject such as



- Drip and sprinkler irrigation system, operation and management.
- Poultry, dairy technology and fish farming.
- Integral farming at live stock management.
- Survey & leveling, precision farming and infiltration rate measurement.
- Exposure on medicinal plant, green house technology.
- Automatic weather station.
- Use of computer in agriculture.
- Production and package of practices of fruit plants.
- Post harvest process and value addition of field crops.
- Special training for Assistant Director of Agriculture on Remote sensing and Geographical Information System.
- Created awareness about water based planning in the state.

❖ 196 training for 9198 Farmers of Water User Association at 18 locations on different Topics such as

- Irrigation methods and farm development.
- On farm water management.
- Irrigation water management in canal command.
- Organic farming and integrated nutrient management.
- Production packages of crops vegetables and medicinal plants.

- Use of Improved technology adaptable to farmer in terms of 360 Adaptive Research Trials for field crops at different basins and 183 adaptive research trials were conducted on vegetables during last decade.

- The productivity of soybean was enhanced by adopting improved practices. There was an increase of 51.8% yield over the farmer's practices with ridge & furrow method. (Variety JS 97-52)
- The water productivity of rice which enhanced by farmer practices replaced with MR 219 variety and improved technology practices. The WUE was 0.70 Kg/m^3 in farmers practices goes up to 9.47% kg/m^3
- The productivity of wheat was increased by 38.40 % over the farmer's practices with improved irrigation technology. (Variety JS 366)
- Yield of tomato has increased by 72.62 % due to scientific package & practices and hybrid variety over farmer practices.
- A farmer's survey in Tikamgarh indicated an increase of yield by 33.34%, 166.67%, 100 % and 96 % for Soybean, rice, wheat and gram respectively.

- A farmer's survey in Damoh indicated an increase of yield by 33.34%, 150%, 100% and 74 % for Soybean, rice, wheat and gram respectively.
- For the first time Micro irrigation demonstration unit visited by chief engineer, Bargi irrigation project during inauguration of workshop impressed him as he said the unit must be replicated in all districts of command.

- Director Agricultural Engineering, Madhaya Pradesh and chief engineer, Bargi Irrigation Project appreciated efforts and agreed to share custom hiring centers for agricultural implements in all over M.P.

Annexure – XI

Curricular vitae of Scientists involved

Name: Dr. R. K. Nema

Name	Dr. Rajendra Kumar Nema			
Date of Birth	05.07.1960			
Designation	Professor & Head, SWE and Dean, CAE			
Qualification	B. Tech	1982	JNKVV Jabalpur	
	M.Tech.	1984	IIT Kharagpur	
	Ph.D.	1995	IARI New Delhi	
Positions Held	Assistant Professor	1984	JNKVV Jabalpur	
	Associate Professor	1995	JNKVV Jabalpur	
	Professor	2007	JNKVV Jabalpur	
Specialized field	Soil and Water Conservation Remote Sensing and GIS applications Groundwater and Canal command management			
Research Projects undertaken	ICAR-AICRP on IWM	2001-2018	PI	
	ICAR-AICRP on IWM	1984-2000	Scientist	
	NATP-CGP	2001-2004	PI	
	MPWSRP (World Bank)	2012-2015	PI	
	MPWSRP (World Bank)	2005-2011	Co-PI	
Research Publications	International	National	Technical Bulletins	Book/ chapter
	05	50	15	06
Citations index	Citations : 92		h-Index : 04	RG score: 12
Four Major contributions	1.	Initiated and developed Remote sensing and GIS lab at CAE Jabalpur		
	2.	Consumptive use studies in Bargi command for dynamic equilibrium of ground water table.		
	3.	Improving water productivity in irrigated commands through improved methods of irrigation and improved crop practices.		
	4.	Study of haveli areas for their recharge contribution to ground water.		

Name: Dr. M.K. Hardaha

Name	Dr. Mahesh Kumar Hardaha			
Date of Birth	01.07.1956			
Designation	Professor SWE			
Qualification	B. Tech		1978	JNKVV Jabalpur
	M.Tech.		1980	IIT Kharagpur
	Ph.D.		2006	JNKVV Jabalpur
Positions Held	Assistant Professor		1981	CTAE Udaipur
			1983	JNKVV Jabalpur
	Associate Professor		1990	JNKVV Jabalpur
	Professor		2006	JNKVV Jabalpur
Specialized field	Soil and Water Conservation Remote Sensing and GIS applications Watershed Management			
Research Projects undertaken	NATP-CGP		2001-2004	Co-PI
	MPWSRP (World Bank)		2005-2008	Co-PI
Research Publications	International	National	Technical Bulletins	Book/ chapter
	05	50	5	08
Citations index	Citations : 46		h-Index : 05	RG score: 12
Four Major contributions	1.	Initiated and developed Remote sensing and GIS lab at CAE Jabalpur		
	2.	Developed agricultural thematic maps on GIS for Tons & Sindh River Basins		
	3.	Soil Aquifer Treatment of Municipal Sewage for reuse in irrigation		
	4.	Assessment of Agricultural Drought in selected areas.		

Name: Dr. M.K. Awasthi

Name	Dr. M.K. Awasthi			
Date of Birth	08.10.1960			
Designation	Professor, SWE			
Qualification	B. Tech	1982	JNKVV Jabalpur	
	M.Tech.	1984	IIT Kharagpur	
	Ph.D.	1999	RDVV, Jabalpur	
Positions Held	Assistant Professor	1984	JNKVV Jabalpur	
	Associate Professor	1999	JNKVV Jabalpur	
	Professor	2008	JNKVV Jabalpur	
Specialized field	Watershed Management Irrigation Water Management Groundwater Recharge			
Research Projects undertaken	ICAR-AICRP on IWM	1984-1986	Scientist	
	ICAR-AICRP on Agro Forestry	198-2001	Scientist	
	TEA on Westland Management	1994-2000	Co-PI	
	MPWSRP (World Bank)	2012-2015	Co-PI	
	NATP Rainwater Management Strategies for Draught Alleviation	2001-2003	Co-PI	
	Management of Excess Water for Sustainable Productivity	2001-2004	Co-PI	
	Evaluation of Biological Interaction in Acacia Rice System	2001-2003	Co-PI	
	ICAR-AICRP on IWM	2001-2018	Scientist	
	ICAR-AICRP on IWM	2018-Continue	Chief Scientist	
Research Publications	International	National	Technical Bulletins	Book/ chapter
	04	34	18	06
Citations index	Citations : 172	h-Index : 08	RG score: 12	
Four Major contributions	1. Development of Micro Watershed at Imaliya.			
	2. Study of haveli areas for their recharge contribution to ground water.			
	3. Water Budgeting of M.P.			
	4. Development of Irrigation Schedules of Drip Irrigation for Major Crops			

Name: Dr. S.K. Sharma

Name	Dr. Shailesh Kumar Sharma			
Date of Birth	14.06.1964			
Designation	Professor			
Qualification	B. Tech	1985	JNKVV Jabalpur	
	M.Tech.	1988	JNKVV Jabalpur	
	Ph.D.	2010	JNKVV Jabalpur	
Positions Held	Assistant Professor	1995	JNKVV Jabalpur	
	Associate Professor	2010	JNKVV Jabalpur	
	Professor	2013	JNKVV Jabalpur	
Specialized field	Soil and Water Conservation Remote Sensing and GIS applications Watershed Prioritization through morphometric analysis			
Research Projects undertaken	NATP-CGP	2002-2004	CoPI	
	MPWSRP (World Bank)	2005-2015	CoPI	

Research Publications	International	National	Technical Bulletins	Book/ chapter
	32	26	06	03
Citations index	Citations : 346		h-Index : 12	RG score: 10.20

Four Major contributions	
1.	Developed Remote sensing and GIS lab at CAE Jabalpur
2.	Developed LULC and crop maps, Thematic maps for Agricultural and Geomorphic attributes of Tons & Sindh basin using RS & GIS
3.	Watershed characterization, Morphometric analysis and Prioritization of watersheds involving RS & GIS
4.	Trained more than 200 officers of different departments for application of RS & GIS

Name: Dr. A.K. Rai

Name	Dr. Anil Kumar Rai			
Date of Birth	19.10.1961			
Designation	Professor & Director Instrumentation, CAE, JNKVV, Jabalpur			
Qualification	B. E.	1984	RDVV Jabalpur	
	M.E.	1986	RDVV Jabalpur	
	Ph.D.	2009	RDVV Jabalpur	
Positions Held	Assistant Professor	1989	JNKVV Jabalpur	
	Associate Professor	2006	JNKVV Jabalpur	
	Professor	2009	JNKVV Jabalpur	
Specialized field	Electrical Engineering, Control Systems Engineering, Microprocessor & Microcontroller, Agri-Electronics, Solar Power System			
Patent	**Patent** has been granted for the developed invention entitled "A sensing device for use with a tractor" **Patent No 232368**.			
Research Projects undertaken	Design & development of Soil Nutrient Estimation System for the estimation of phosphorous, and organic carbon	1990-92	Co-PI	
	Fertiliser Recommendation Package. The software is useful in recommending fertiliser doses for targetted yield and the cost inputs.	1992-93	Co-PI	
	Digital & Microprocessor based Grain Moisture Measurement System.	1993-95	Co-PI	
	Microcontroller (8031) based Soil Nutrient Estimation System.	1996-98	Co-PI	
	Soil Moisture Indicator	1999-2000	Co-PI	
	Development of Multimedia software E-agrotech	2001-04	Co-PI	
	Vegsoft	2006-09	Co-PI	
	Data base generation & evaluation of production technology for aromatic and medicinal plant	2010-13	PI	
	Seed Drill Choke Indicator for Tractor Driven Seeddrill	2013-16	PI	
Research Publications	International	National	Technical Bulletins	Book/ chapter
	02	40	11	03
Citations index	Citations : 22		h-Index : 02	
Major contributions	1. Undersigned made efforts to implement 220 KWp-33 KV Grid connected Roof Top Solar Power Plant, 190 KWp-11KV Grid Connected Rooftop Solar Power Plant and 300 KW Net metering LT Grid Connected Solar Power Plant under RESCo model at JNKVV Jabalpur			
	2. Design and development of low cost Electronics Instruments for the use of Farmers.			
	3. Performing duty as University Co-ordinator of IIRS Outreach Programme. Students of PG/PhD has been participated, awarded certificate for having completed the course. Online courses and examination arranged at JNKVV Jabalpur.			

Name: Dr. Y.K. Tiwari

<table>
<tr><td>Name</td><td colspan="4">Dr. Yogesh Kishore Tiwari</td></tr>
<tr><td>Date of Birth</td><td colspan="4">07.08.1962</td></tr>
<tr><td>Designation</td><td colspan="4">Associate Professor, Department of Soil and Water Engineering
College of Agricultural Engineering, JNKVV, Jabalpur</td></tr>
<tr><td rowspan="3">Qualification</td><td>B. Tech</td><td>1984</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>M.Tech.</td><td>1986</td><td colspan="2">G.B. Pant University of Agriculture and Technology, Pantnagar (U.P.)</td></tr>
<tr><td>Ph.D.</td><td>2017</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td rowspan="2">Positions Held</td><td>Assistant Professor</td><td>1988</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Associate Professor</td><td>2006</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Specialized field</td><td colspan="4">Soil and Water Conservation
Groundwater and Canal command management
Conjunctive use of canal and ground water
Management of Excess Water in medium and low lands for Sustainable Productivity for Rain fed conditions.</td></tr>
<tr><td rowspan="6">Research Projects undertaken</td><td>ICAR-AICRP on IWM</td><td>2001-2018</td><td colspan="2">Co-PI</td></tr>
<tr><td>ICAR-AICRP on GWU</td><td>1991-2000</td><td colspan="2">Scientist</td></tr>
<tr><td>NATP-CGP</td><td>2001-2004</td><td colspan="2">Co-PI</td></tr>
<tr><td>NATP-RRPS 5</td><td>1999-2000</td><td colspan="2">Co-PI</td></tr>
<tr><td>NATP-RRPS 5</td><td>2001-2004</td><td colspan="2">PI</td></tr>
<tr><td>MPWSRP (World Bank)</td><td>2006-2015</td><td colspan="2">Co-PI</td></tr>
<tr><td rowspan="2">Research Publications</td><td>International</td><td>National</td><td>Technical Bulletins</td><td>Book/ chapter</td></tr>
<tr><td>00</td><td>31</td><td>20</td><td>04</td></tr>
<tr><td>Citations index</td><td colspan="2">Citations : 44</td><td>h-Index : 03</td><td>RG score 1.70</td></tr>
<tr><td rowspan="4">Four Major contributions</td><td>1.</td><td colspan="3">Management of Excess Water in medium and low lands for Sustainable Productivity for Rain fed conditions.</td></tr>
<tr><td>2.</td><td colspan="3">Conjunctive use studies in Bargi command for dynamic equilibrium of ground water table.</td></tr>
<tr><td>3.</td><td colspan="3">Improving water productivity in irrigated commands through improved methods of irrigation and improved crop practices.</td></tr>
<tr><td></td><td>4.</td><td colspan="3">Demonstration of Micro Irrigation System</td></tr>
</table>

Name: Dr. M. L. Sahu

<table>
<tr><td>Name</td><td colspan="5">Dr. Manohar Lal Sahu</td></tr>
<tr><td>Date of Birth</td><td colspan="5">04.07.1958</td></tr>
<tr><td>Designation</td><td colspan="5">Associate Professor SWE, CAE</td></tr>
<tr><td rowspan="3">Qualification</td><td colspan="2">B. Tech</td><td>1982</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td colspan="2">M.Tech.</td><td>1984</td><td colspan="2">IIT Kharagpur</td></tr>
<tr><td colspan="2">Ph.D.</td><td>2006</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td rowspan="2">Positions Held</td><td colspan="2">Assistant Professor</td><td>1984</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td colspan="2">Associate Professor</td><td>2006</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Specialized field</td><td colspan="5">Soil and Water Conservation
Watershed Development & Management
Forest Hydrology</td></tr>
<tr><td rowspan="5">Research Projects undertaken</td><td colspan="2">MPWSRP (World Bank)</td><td>2010-2011</td><td colspan="2">Co-PI</td></tr>
<tr><td colspan="2">ICAR-AICRP on IWM</td><td>2011-2012</td><td colspan="2">Co-PI</td></tr>
<tr><td colspan="2">Bio-drainage Project (INCID, ministry of Water Resources,GOI, New Delhi)</td><td>2012-2015</td><td colspan="2">Co-PI</td></tr>
<tr><td colspan="2">ICAR-AICRP on Agroforestry</td><td>2012-2017</td><td colspan="2">Co-PI</td></tr>
<tr><td colspan="2">ICAR-AICRP on Agroforestry</td><td>2017-2018</td><td colspan="2">PI</td></tr>
<tr><td rowspan="2">Research Publications</td><td>International</td><td>National</td><td colspan="2">Technical Bulletins</td><td>Book/ chapter</td></tr>
<tr><td>-</td><td>17</td><td colspan="2">-</td><td>01</td></tr>
<tr><td colspan="2">Citations index</td><td colspan="2">Citations : -</td><td colspan="2">h-Index : - RG score: -</td></tr>
<tr><td rowspan="4">Four Major contributions</td><td>1.</td><td colspan="4">Initiated and developed Waterlogged fields of Nimsadia-Jasalpur under Tawa Command Area at Hoshangabad, M.P.</td></tr>
<tr><td>2.</td><td colspan="4">Water Productivity studies in Agroforestry plantations</td></tr>
<tr><td>3.</td><td colspan="4">Water Foot Print studies in Agroforestry plantations</td></tr>
<tr><td>4.</td><td colspan="4">Study of throughfall, stemflow, interception losses & infiltration under social forestry plantations.</td></tr>
</table>

Name: Dr. R. N. Shrivastava

Name		Dr. Ratnesh Narayan Shrivastava			
Date of Birth		08.01.1963			
Designation		Associate Professor ,SWE			
Qualification		B. Tech	1984	JNKVV Jabalpur	
		M.Tech.	1996	JNKVV Jabalpur	
		Ph.D.	2011	JNKVV Jabalpur	
Positions Held					
		Associate Professor	2012	JNKVV Jabalpur	
Specialized field		Soil and Water Conservation Water Resource management			
Project		ICAR-AICRP on IWM	1987-2012	Scientist	
Research Publications		International	National	Technical Bulletins	Book/ chapter
		05	20	10	02
Four Major contributions	1.	Popularization of Improved Water lifting devices in tribal areas.			
	2.	Improvement inoperational Efficiency of Irrigation Pumps			
	3.	Pressurized Irrigation in Canal command areas.			
	4.	Strategy of Water Resource utilization			

Name: Dr. S.K. Pyasi

Name	Prof. (Dr.) Sushil Kumar Pyasi			
Date of Birth	15.03.1964			
Designation	Professor, SWE, CAE, Jabalpur			
Qualification	B. Tech		1986	JNKVV Jabalpur
	M.Tech.		1988	JNKVV Jabalpur
	Ph.D.		1998	GBPUAT,Pantnagar
Positions Held	Assistant Professor		1990	BAU, Ranchi
	Associate Professor		1998	BAU, Ranchi and JNKVV Jabalpur
	Professor		2007	JNKVV Jabalpur
Specialized field	Soil and Water Conservation Watershed Management Hydrological Modelling			
Research Projects undertaken	ICAR- NATP		1998-2002	PI
	ICAR- NARP		2002- 2004	In-Charge Project
	MPWSRP (World Bank)		2005-2009	CO-PI
Research Publications	International	National	Technical Bulletins	Book/ chapter
	04	35	10	05
Citations index	-		-	-
Four Major contributions	1.	Low cost technology for rain water management in farmers field		
	2.	Irrigation water management techniques in farmers field		
	3.	Development of hydrological models for runoff and sediment yield prediction.		
	4.	Study of treated waste water for its use in micro irrigation system		

Name: Dr. A.K. Bajpai

<table>
<tr><td>Name</td><td colspan="4">Dr. A.K. Bajpai</td></tr>
<tr><td>Date of Birth</td><td colspan="4">10.06.1961</td></tr>
<tr><td>Designation</td><td colspan="4">Associate Professor, SWE</td></tr>
<tr><td rowspan="3">Qualification</td><td>B. Tech</td><td>1984</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>M.Tech.</td><td>1987</td><td colspan="2">GBPUAT, Pantnagar</td></tr>
<tr><td>Ph.D.</td><td>1999</td><td colspan="2">IARI, New Delhi</td></tr>
<tr><td rowspan="2">Positions Held</td><td>Assistant Professor</td><td>1988</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Associate Professor</td><td>1999</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Specialized field</td><td colspan="4">Watershed Management and Participatory Rural Appraisal (PRA), Groundwater Wells and its Recharging
Micro Irrigation System (MIS)</td></tr>
<tr><td rowspan="5">Research Projects undertaken</td><td>NARP-ICAR</td><td>1988-1991</td><td colspan="2">Asstt. Prof.</td></tr>
<tr><td>Drainage Project of Tawa Command Area</td><td>2007-2009</td><td colspan="2">Co-PI</td></tr>
<tr><td>Waste land Development</td><td>2003-2007</td><td colspan="2">Co-PI</td></tr>
<tr><td>MPWSRP (World Bank)</td><td>2004-2007</td><td colspan="2">Co-PI Tawa Command</td></tr>
<tr><td>Bundelkhand special package</td><td>2007-2009</td><td colspan="2">Resource Person</td></tr>
<tr><td rowspan="2">Research Publications</td><td>International</td><td>National</td><td>Technical Bulletins</td><td>Book/ chapter</td></tr>
<tr><td>02</td><td>17</td><td>04</td><td>02</td></tr>
<tr><td>Citations index</td><td colspan="2">Citations : 71</td><td>h-Index : 06</td><td>RG score: 05</td></tr>
<tr><td rowspan="4">Four Major contributions</td><td>1.</td><td colspan="3">Development of Micro Watershed at Sarria Nala.</td></tr>
<tr><td>2.</td><td colspan="3">Study of Ridge and Sunken bed cultivation for rice and soybean</td></tr>
<tr><td>3.</td><td colspan="3">Watershed Assessment.</td></tr>
<tr><td>4.</td><td colspan="3">Development of Micro Irrigation Schedules for Vegetable Crops</td></tr>
</table>

Name: Dr. C.M. Abroal

Name	C.M. Abroal				
Date of Birth	20.06.1959				
Designation	Associate Professor, PHP&FE & Head, SWE and Dean, CAE				
Qualification	B. Tech		1981	JNKVV Jabalpur	
	M.Tech.		1983	IIT Kharagpur	
	Ph.D. Under Completion		2020	J.N.K.V.V.	
Positions Held	Assistant Professor		1984	JNKVV Jabalpur	
	Associate Professor		2006	JNKVV Jabalpur	
Specialized field	Post Harvest Engineering Seed Processing Mechanical Drying/Heated air drying				
Research Projects undertaken	Nil				
Research Publications	International	National	Technical Bulletins	Book/ chapter	
	Nil	05	05	0/01	
Citations index	Citations : -		h-Index : -	RG score: -	
Four Major contributions	1.	Operation and maintenance of Seed Processing Plant as Nodal Officer			
	2.	Teaching course Refrigeration and Air Conditioning to UG and PG			
	3.	Research on Drying of different crops.			
	4.	Research on Parboiling and of Paddy and Rice Milling.			

Name: Dr. Om Gupta

Name	Dr. Om Gupta			
Date of Birth	**March 26, 1956**			
Designation	Director, DES, JNKVV, Jabalpur M.P.			
Qualification	B.Sc. (Science)	1973	APS University, Rewa (M.P.)	
	M.Sc. (Agriculture) Plant Pathology	1976	JNKVV, Jabalpur,482004 (M.P.)	
	Ph.D. (Botany)	1984	R D University Jabalpur (M.P.)	
Positions Held	SRA/ Asst.	1977	JNKVV Jabalpur	
	Associate Professor	1991	JNKVV Jabalpur	
	Professor	1999	JNKVV Jabalpur	
	Head, Plant Pathology	2011	JNKVV Jabalpur	
	Dean, COA, JBP	2015	JNKVV Jabalpur	
	Director, DES	2018	JNKVV Jabalpur	
Specialized field	- Chickpea pathologist breeder - Developed IDM- Wilt, Root Rots - Identification of genotypes against collar rot (*Sclerotium rolfsii*), with (*Fusarium oxysporum*) and dry root rot (*Rhizoctoniabataticola*)			
Research Projects undertaken	ICAR-NBPGR, Network Project	2005-2008	CoPI	
	Wilt Network Project	2009-2014	CCPI	
	DBT Network project	2009-2014	PI	
Research Publications	International	National	Technical Bulletins	Book/ chapter
	06	50	22	04
Citations index	Citations : 302		h-Index : 10	RG score: 24

Four Major contributions	1.	Major diseases of pulse crops viz., Chickpea, Pigeonpea, Pea, Lentil, Lathyrus, Blackgram and Greengram under "All India Co-ordinated Pulse Improvement Project, ICAR, and in collaboration with ICRISAT (Chickpea, pigeonpea) the then MPARI,
	2.	**Development of chickpea varieties in collaboration (07)**
	3.	Management of major diseases of Chickpea has been achieved by screening large number of germplasm/genotypes (ICAR-ICRISAT, ICAR-ICARDA and ICAR-NBPGR) in multiple disease sick plot and under natural condition of high disease incidence and the identified genotypes/varieties are being used in breeding program.
	4.	**Developed dual resistant (wilt and root rot)**MPJG 89--2862, 9023, 11550, 11551, ICCV-89402, 90201, 90254, ICC 12467 ,IC 327332, BG-209, H88-2, RSG-180, IC267, 2083, 3103, 3439, GF 88426, FG 81.**JG 2001-12, JG 315, JG 2003-14-16, JG 24**

Name: Dr. S.K. Pandey

Name	Dr. Shailendra Kumar Pandey			
Date of Birth	21.09.1960			
Designation	Professor & Head, Horticulture, CoA, Jabalpur			
Qualification	B.Sc. (Ag.)	1980	JNKVV, Jabalpur	
	M.Sc. (Ag.) Hort.	1982-83	JNKVV, Jabalpur	
	Ph.D.	1998	RDVV, Jabalpur	
Positions Held	Assistant Professor/ Junior Scientist	01/02/1986	JNKVV Jabalpur	
	Associate Professor/ Senior Scientist	17/06/1996	JNKVV Jabalpur	
	Professor/ Principal Scientist	17/06/2006	JNKVV Jabalpur	
	Head, Department of Horticulture	01/08/2018	JNKVV Jabalpur	
Specialized field	Nursery Management and Commercial Fruit Production			
Research Projects undertaken	BARC: Use of irradiation for delayed ripening and prolonged storability of fruits		2002-2006	PI
	ICAR: Multiplication of genuine planting material of fruit crops		2001-02 (continued)	PI
	NHB, GoI: Establishment of mother plants nurseries for high pedigree planting material for fruit crops funded by National Horticulture Board, Govt. of India		2011-continued	PI
	AICRP- Arid Zone Fruits		2008-2011	PI
	AICRP Spices		2018-conti	PI
	NHM, GoI: Establishment of model nursery (big and small) and leaf tissue analysis lab.		2008-09 to 2012-13	Co-PI
Citations index	Citations :		h-Index :	RG score:

Research Publications	Research Paper	Book/ Practical manual	Book chapter	Technical bulletins
	54	02	02	03

Major contributions		
	1.	Establishment and development of High Density Orchard of Mango, guava at FRS Imalia and Guest House No.3 and Krishi Nagar.
	2.	Establishment of Multistoery cropping system at FRS Imaliya.
	3.	Establishment of Sapota, Pomegranate and lime orchards in FRS Imalia.
	4.	Standardization of package and practices for turmeric cultivation as intercrop in mango, guava and citrus orchards.
	5.	Standardization of budding, grafting, layering and cutting practices in mango, guava, lime, aonla, custard apple and pomegranate

Name: Dr. P.B. Sharma

Name	Dr. Pratap Bhanu Sharma				
Date of Birth	05.01.1959				
Designation	Professor Agronomy Chief Agronomist AICRP for IFS, CoA, Jabalpur				
Qualification	B. Sc.	1980	JNKVV Jabalpur		
	M.Sc.	1982	JNKVV Jabalpur		
	Ph.D.	1991	HS Gour University, Sagar		
Positions Held	Assistant Professor	1985	JNKVV Jabalpur		
	Associate Professor	1998	JNKVV Jabalpur		
	Professor	2006	JNKVV Jabalpur		
Specialized field	Agronomy				
Research Projects undertaken	Tawa Pilot Project	1985-1991	Co-PI		
	AICRP on Oil Seed	1991-2000	Co-PI		
	KVK Guna & Narsingpur	2000-2007	PC		
	AICRP IWM	2007-2017	Co-PI		
	AICRP Agromet	2018-2019	PI		
	AICRP on IFS	2019-conti	Chief Scientist		
Research Publications	International	National	Technical Bulletins	Book/ chapter	
	00	35	05	00	
Citations index	Citations :		h-Index :	RG score:	
Four Major contributions	1.	Weed management in Tawa Command area			
	2.	Oil seed projection technology (Sesame & Niger)			
	3.	Up scaling of production technology			
	4.	Water Management in deep vertisols.			

Name: Dr. Rakesh Bajpai

Name		Dr. Rakesh Bajpai			
Date of Birth		14.09.1960			
Designation		Professor & Head, Department of Forestry, Collage of Agriculture, Jabalpur			
Qualification		B.Sc. Ag.		1982	JNKVV Jabalpur
		M.Sc.		1984	JNKVV Jabalpur
		Ph.D.		1987	JNKVV Jabalpur
Positions Held		Assistant Professor		1988	JNKVV Jabalpur
		Associate Professor		199p	JNKVV Jabalpur
		Professor		2007	JNKVV Jabalpur
Specialized field		Forest Entomology			
Research Projects undertaken		National Network R&D on Karanj, NOVOD Board, New Delhi		2005-2011	Co-PI
		Technology Development Extension Training in Agro Forestry in Non forest Areas (NWDP, New Delhi),		1990-2000	Co-PI
		Bio Control Project, ICFRE, Dehradun		2017 Continuing	Co-PI
Research Publications		International	National	Technical Bulletins	Book/ chapter
		03	40	06	04
Citations index		Citations : 48		h-Index : 03	RG score: 37
Four Major contributions	1.	Identification of major pest of forest/Agro forestry system.			
	2.	Insect Pest Management in Agro Forestry.			
	3.	Soil/Nursery pest management.			
	4.	Silvi culture and biological control of insect pest of forest.			

Name: Dr. S.B. Das

Name	Dr. Shoumitra Bikash Das			
Date of Birth	05.07.1960			
Designation	Professor, Department of Entomology, JNKVV, Jabalpur			
Qualification	B. Sc.		1981	RDVV
	M.Sc (Ag.) (Ent.)		1984	JNKVV
	Ph.D. (Ag.) (Ent.)		1990	JNKVV
Positions Held	Assistant Professor / Junior Scientist		1988	JNKVV
	Associate Professor / Scientist		1998	JNKVV
	Professor		2006	JNKVV
Specialized field	Integrated Pest Management & Biocontrol			
Research Projects undertaken	ICAR-AICRP on Pigeonpea		1988-2013	Co-PI
	Studies on Cotton - Wheat cropping sequence with special reference to dates of sowing and spacing of hybrid cotton in West Nimar region of M.P., India."		2000-2002	Co-PI
	Gramin Vikas Trust		2001-2003	PI
	Setting up of facilities for hands on training – Mass production of bio agents and biopesticides		2008-2012	PI
	ICAR- AICRP on Biological Control of Crop Pests & weeds		2009-2013	Co-PI
	DBT- Integrated Agri – Biotechnologies for Socio Economic Upliftment of Baiga and Gond tribes of Madhya Pradesh		2010-2014	Co-PI
	ICAR- NICRA- RTPPS –Pigeonpea		2011-2017	Co-PI
	JICA- "IPM adopting seed dressing and selective pesticides for enhancing natural enemy activities"		2012-2016	PI
	Use of Microbes for Plant Protection and Nutrient Management in Increasing Crop Productivity		2013-2016	Co-PI
	ICAR- Organic Farming (Vermi- composting / Bio fertilizer) products		2013-2016	Co-PI
	RKVY- Establishment of Post Quarantine Laboratory		2015-2018	Co-PI
	RKVY- Strengthening of Production Facility of Entomopathogenic Fungi & Their Promotion		2016-2018	PI
Research Publications	**International**	**National**	**Technical Bulletins**	**Book/ chapter**
	04	90	10	04
Citations index	Citations : 154		h-Index : 07	RG score:
Four Major contributions	1.	Initiated and developed Biocontrol Research & Production Centre at College of Agriculture, Jabalpur		
	2.	Developed IPM modules for the management of insect pests of pigeonpea & bengal gram		
	3.	Developed IPM modules for the management of insect pests of soybean , brinjal, tomato, chilli and okra		
	4.	Developed forecasting models of whitefly, gram pod borer & pigeonpea pod fly		
Training	"Application of Remote Sensing Techniques And Geographical Information System In Natural Resources Survey & Management" from 21-03-2001 to 01-04-2001 at Remote Sensing Application Centre (RSAC), Bhopal (M.P.)			

Name: Dr. Gyanendra Tiwari

Name	Dr. Gyanendra Tiwari			
Date of Birth	15.06.1971			
Designation	Associate Professor, Department of Plant Physiology, College of Agriculture, JNKVV, Jabalpur			
Qualification	B. Sc. Forestry	1995	JNKVV Jabalpur	
	M.Sc.(Ag)Botany & Crop Physiology	1998	JNKVV Jabalpur	
	Ph.D. Botany Specialization in Plant Physiology	2003	APS University Rewa	
Positions Held	Assistant Professor	2004	JNKVV Jabalpur	
	Associate Professor	2012	JNKVV Jabalpur	
Specialized field	Crop Stress Physiology Medicinal and Aromatic Plants Physiology of secondary metabolites			
Projects undertaken	Mandi Board, MP on Establishment of Medicinal Plant Lab	2005-2007	Co-PI	
	National Horticulture Mission on Establishment of Model Nursery on Medicinal Plants	2009-11	Co-PI & Scientist I/C	
	MP State Biodiversity Board on Survey, collection and conservation of wild and traditional agricultural cultivars of Vindhya Plateau of MP	2015-2017	PI	
	Maintenance of Botanical Garden	2017-2019	PI	
	JNKVV Seed Revolving Fund Scheme	2017-19	Co-PI & I/C	
Research Publications	International	National	Technical Bulletins	Book/ chapter
	04	40	02	06
Citations index	Citations : 5		h-Index : 02	RG score: 2.76
Four Major contributions	1. Established well equipped Analytical Lab of Medicinal & aromatic plants at College of Horticulture, Mandsaur			
	2. Established New Herbal Garden (1.5 ha) having collection of more than 550 species of Medicinal plants at College of Horticulture, Mandsaur			
	3. Extension of Sweet basil cultivated area from zero to 15000 ha during 2006-2012 in Malwa Plateau of MP as alternative to Soybean crop			
	4. Resource generation of approx. 24.0 lakhs through sell of seed/ planting material/produce of medicinal plants under JNKVV Seed Revolving Fund Scheme during July, 2017 to Dec., 2019			

Name: Dr. Manish Bhan

<table>
<tr><td>Name</td><td colspan="6">Dr. Manish Bhan</td></tr>
<tr><td>Date of Birth</td><td colspan="6">06.12.1975</td></tr>
<tr><td>Designation</td><td colspan="6">Assistant Professor</td></tr>
<tr><td rowspan="3">Qualification</td><td colspan="3">B. Sc (Agri)</td><td>1998</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td colspan="3">MSc (Agric)</td><td>2001</td><td colspan="2">JNKVV, Jabalpur</td></tr>
<tr><td colspan="3">Ph.D.</td><td>2010</td><td colspan="2">Univ. of Florida, USA</td></tr>
<tr><td>Positions Held</td><td colspan="3">Assistant Professor</td><td>2011</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Specialized field</td><td colspan="6">Agrometeorology, Crop-weather statistical and simulated models, Climate change mitigations, crop-weather relationship</td></tr>
<tr><td rowspan="5">Research Projects undertaken</td><td colspan="3">ICAR-AICRP on Agrometeorology</td><td colspan="2">2011 to date</td><td>PI</td></tr>
<tr><td colspan="3">AICRPAM-NICRA (ICAR)</td><td colspan="2">2011 to date</td><td>PI</td></tr>
<tr><td colspan="3">GKMS (MoES, IMD)</td><td colspan="2">2011 to date</td><td>PI</td></tr>
<tr><td colspan="3">FASAL (MNCFC)</td><td colspan="2">2011 to date</td><td>PI</td></tr>
<tr><td colspan="3">Direct Seeded Rice (PI)</td><td colspan="2">2016-2019</td><td>PI</td></tr>
<tr><td rowspan="2">Research Publications</td><td>International</td><td>National</td><td colspan="2">Technical Bulletins</td><td colspan="2">Book/ chapter</td></tr>
<tr><td>04</td><td>17</td><td colspan="2">5</td><td colspan="2">1/2</td></tr>
<tr><td>Citations index</td><td colspan="2">Citations : 96</td><td colspan="2">h-Index : 05</td><td colspan="2">RG score: 7.6</td></tr>
<tr><td rowspan="4">Four Major contributions</td><td>1.</td><td colspan="5">Developed techniques to plant direct seeded rice management with sustainable yield</td></tr>
<tr><td>2.</td><td colspan="5">Develop agroclimatic characterization of Central India to assess sowing risk under rainfed situation</td></tr>
<tr><td>3.</td><td colspan="5">Develop crop-weather calendar of rice, wheat, chickpea and soybean crops</td></tr>
<tr><td>4.</td><td colspan="5">Generated coefficients for simulated models to assess climate change scenarios of rice, wheat and chickpea crops</td></tr>
</table>

Dr. R. Shiv Ramakrishnan Mudaliyar

<table>
<tr><td>Name</td><td colspan="5">Dr. R. Shiv Ramakrishnan Mudaliyar</td></tr>
<tr><td>Date of Birth</td><td colspan="5">20.08.1984</td></tr>
<tr><td>Designation</td><td colspan="5">Scientist , Department of Plant Breeding and Genetics, JNKVV, Jabalpur</td></tr>
<tr><td rowspan="3">Qualification</td><td colspan="2">B. Sc</td><td>2006</td><td colspan="2">RDVV Jabalpur</td></tr>
<tr><td colspan="2">M.Sc</td><td>2009</td><td colspan="2">AAIDU, Allahabad</td></tr>
<tr><td colspan="2">Ph.D.</td><td>2016</td><td colspan="2">IARI, New Delhi</td></tr>
<tr><td>Positions Held</td><td colspan="2">Assistant Professor</td><td>2017</td><td colspan="2">JNKVV-CoA, Powarkheda</td></tr>
<tr><td></td><td colspan="2">Scientist(AICRP-NSP-Seed Technology Research)</td><td>2018</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Specialized field</td><td colspan="5">Physiological, Biochemical and Molecular Mechanism of abiotic stress tolerance in Plants.

Seed Physiology, Storage & Testing</td></tr>
<tr><td rowspan="2">Research Projects undertaken</td><td colspan="3">DBT-GOI, New Delhi</td><td>2019</td><td>PI</td></tr>
<tr><td colspan="3">ICAR-TSP project on Chenopodium Quinoa</td><td>2005-2015</td><td>CoPI</td></tr>
<tr><td rowspan="2">Research Publications</td><td colspan="2">International</td><td>National</td><td>Technical Bulletins</td><td>Book/ chapter</td></tr>
<tr><td colspan="2">02</td><td>15</td><td>00</td><td>01</td></tr>
<tr><td>Citations index</td><td colspan="3">Citations : 24</td><td>h-Index : 4</td><td>RG score: 4.16</td></tr>
<tr><td rowspan="4">Four Major contributions</td><td>1.</td><td colspan="4">Deciphered the role of cytokinin and its signal transduction cascade in the photoprotection of photosynthetic machinery and its association with staygreen trait induced drought tolerance mechanism at molecular level in wheat</td></tr>
<tr><td>2.</td><td colspan="4">Standardization of leaf senescence rate quantification protocol through visual scoring in plants.</td></tr>
<tr><td>3.</td><td colspan="4">Introduction and expansion of chenopodium quinoa in the rainfed rice fallow area of climatically vulnerable tribal distirct of Madhya Pradesh.</td></tr>
<tr><td>4</td><td colspan="4">Identified Stay green 1 SGR1 gene for chlorophyll catabolism in wheat.</td></tr>
</table>

Name: Dr. Sunil Bhaskar rao Nahatkar

Name	Dr. Sunil Bhaskar Rao Nahatkar			
Date of Birth	07.09.1958			
Designation	Professor & Director, Institute of Agribusiness Management			
Qualification	B.Sc.(Ag)	1980	JNKVV Jabalpur	
	M.Sc.(Ag. Econ)	1982	JNKVV Jabalpur	
	Ph.D. (Ag. Econ)	1991	JNKVV Jabalpur	
Positions Held	Assistant Professor	1986	JNKVV Jabalpur	
	Associate Professor	1996	JNKVV Jabalpur	
	Professor	2006	JNKVV Jabalpur	
Specialized field	Agri. Production Economics Agri-Business Management Agri- Startups Ecosystem Development			
Research Projects undertaken	NABARD Chair Unit	2001-2005	Research Officer	
	Surveillance study of soybean cultivation in east Madhya Pradesh under JICA project	2011-2017	PI	
	Tentative soybean cultivation manual and demonstration trials in east Madhya Pradesh under JICA project	2012-2017	PI	
	Capacity building programme on incubation opportunities for agribusiness in FPOs	2017-2018	PI	
	RKVY-RAFTTAR Agribusiness Incubation Center	2018-2019	PI	
Research Publications	International	National	Technical Bulletins	Book/ chapter
	02	98	32	08
Citations index	Citations : 86		h-Index : 06	RG score: -
Four Major contributions	1.	Evaluated four NABARD funded project		
	2.	Develop Soybean production and utilization hand book for farmers		
	3.	Organized capacity building programs for FPO for Agribusiness opportunities		
	4.	Develop Agri-startups Ecosystem and incubated 22 Agri-startups		

Name: Dr. H.L. Sharma

<table>
<tr><td>Name</td><td colspan="4">Dr. Hira Lal Sharma</td></tr>
<tr><td>Date of Birth</td><td colspan="4">01.09.1956</td></tr>
<tr><td>Designation</td><td colspan="4">Professor & Head, Mathematics & Statistics, COA, Jabalpur</td></tr>
<tr><td rowspan="3">Qualification</td><td colspan="2">B. Sc.</td><td>1976</td><td>B.H.U.Varanasi</td></tr>
<tr><td colspan="2">M.Sc.(Statistics)</td><td>1978</td><td>B.H.U.Varanasi</td></tr>
<tr><td colspan="2">Ph.D. (Statistics)</td><td>1988</td><td>B.H.U.Varanasi</td></tr>
<tr><td rowspan="3">Positions Held</td><td colspan="2">Assistant Professor</td><td>1983</td><td>JNKVV Jabalpur</td></tr>
<tr><td colspan="2">Associate Professor</td><td>1996</td><td>JNKVV Jabalpur</td></tr>
<tr><td colspan="2">Professor</td><td>2004</td><td>JNKVV Jabalpur</td></tr>
<tr><td>Specialized field and Books and Post-Doctoral Training</td><td colspan="4">Demography, Probability Models, Design of Experiments specially “ Construction of Incomplete block Designs”
Books published in Statistics: Three
(i) Basic Statistical Methods with Applications, Agrotech Publishing Academy, Udaipur (India).
(ii) Practicals in Statistics, Agrotech Publishing Academy, Udaipur (India).
(iii) Experimental Designs and Survey Sampling, Agrotech Publishing Academy, Udaipur (India).
Post Doctoral Training:
I had been awarded Rockefeller Foundation Fellowship for advanced study in Population Sciences in the University of Pennsylvania, Philadelphia (U.S.A.) during the academic year 1990-91.
Papers presented in the international seminar/conference
Sharma, Hira L. (1998). Frequency of geographic mobility recorded in the National Health Interview survey: Two analytical models, presented in the Annual Meeting of the population Association of America Chicago, IL, (USA), April 2-4, (Abstract Published).
Sharma, Hira L. (1991). On the correlation coefficients between the numbers of boys and girls in a family, presented in the Joint Statistical Meetings of the American Statistical Association, Atlanta, Georgia, (USA), (Abstract Published).
Sharma, Hira L. (2018). Three dimensional indices of women empowerment and fertility in India, Presented in the Annual Meeting of the population Association of America Denver, Colorado, (USA), April 24-26, (Abstract Published).</td></tr>
<tr><td rowspan="2">Research Publications</td><td>International</td><td>National</td><td>Books Published</td><td>Book/ chapter</td></tr>
<tr><td>05</td><td>95</td><td>03</td><td>01</td></tr>
<tr><td>Citations index</td><td colspan="2">Citations : 100</td><td colspan="2">h-Index : 08</td></tr>
<tr><td rowspan="4">Four Major contributions</td><td>1.</td><td colspan="3">Derived a tactical configuration of strength β+1 from strength β</td></tr>
<tr><td>2.</td><td colspan="3">Derived a design known as B- arrays for intercropping experiments.</td></tr>
<tr><td>3.</td><td colspan="3">Developed certain mathematical probability models for happening of the number of out-migrants from their households</td></tr>
<tr><td>4.</td><td colspan="3">Derived and constructed Orthogonal and Balanced Arrays for strength β+1.</td></tr>
</table>

Name: Dr. Deepak Rathi

Name	Dr. Deepak Rathi			
Date of Birth	24.06.1973			
Designation	Senior Scientist (Agro Economics Research Centre)			
Qualification	B. Sc. (Ag.)	1995	JNKVV Jabalpur (M.P.)	
	M.Sc. (Ag.)	1997	JNKVV Jabalpur (M.P.)	
	Ph.D.	2004	M.G.C.G.V., Chitrakoot, Satna (M.P.)	
Positions Held	Research Officer	2005	National Commission on Farmers, Min. of Agri., GoI , New Delhi	
	Senior Research Officer	2006	National Disaster Management Authority, MHA, P.M.O. New Delhi	
	Assistant Professor	2007	JNKVV Jabalpur	
	Associate Professor	2012	JNKVV Jabalpur	
Specialized field	Farm Management and Production Economics Agril. Finance, Marketing and Trade Policy for Agriculture and Rural Development at National Level			
Research Projects undertaken	Japan International Co-operation Agency	20011-2016	PI	
	Mahila Vit Vikas Nigam on Empowerment of Rural Women (Three Projects)	2017-18	PI and CoPI	
	Impact of PMKSY	2016-17	Co-PI	
Research Publications	International	National	Technical Bulletins	Book/ chapter
	01	41	02	04
Citations index	Citations : 52		h-Index : 03	RG score: 07
Four Major contributions	1.	Identified bottlenecks of yield barrier of Soybean and Suggested ways to overcome them		
	2.	Policy initiative suggested in the research report - MGNREGS under Rural Ministry and Ministry of Agriculture should work together to bring convergence and synergy at grassroot level		
	3.	Impact assessment of various agricultural technologies including Watershed		

Name: G.S. Tagore

<table>
<tr><td>Name</td><td colspan="5">Gopal Singh Tagore</td></tr>
<tr><td>Date of Birth</td><td colspan="5">07.12.1978</td></tr>
<tr><td>Designation</td><td colspan="5">Scientist</td></tr>
<tr><td rowspan="3">Qualification</td><td colspan="2">B.Sc. Ag</td><td>2000-01</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td colspan="2">M.Sc. Ag (Soil Science and Agril. Chemistry)</td><td>2004-05</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td colspan="2">NET</td><td>2010</td><td colspan="2">ASRB (ICAR)</td></tr>
<tr><td rowspan="2">Positions Held</td><td colspan="2">Technical Assistant</td><td>2006</td><td colspan="2">Remote Sensing Application Centre, M.P. Council of Science and Technology, Bhopal (M.P.)</td></tr>
<tr><td colspan="2">Scientist</td><td>2012</td><td colspan="2">JNKVV Jabalpur</td></tr>
<tr><td>Specialized field</td><td colspan="5">Soil Science, Remote Sensing and GIS applications Use of Geo-Spatial Techniques in Agriculture</td></tr>
<tr><td>Research Projects undertaken</td><td colspan="2">ICAR-AICRP on MSN and PE</td><td colspan="2">2012 to continue</td><td>Co-PI</td></tr>
<tr><td rowspan="2">Research Publications</td><td>International</td><td>National</td><td>Technical Bulletins</td><td colspan="2">Book/ chapter</td></tr>
<tr><td>15</td><td>8</td><td>02</td><td colspan="2">02</td></tr>
<tr><td>Citations index</td><td colspan="2">Citations : 80</td><td colspan="2">h-Index : 04</td><td>RG score: 5.54</td></tr>
<tr><td rowspan="4">Four Major contributions</td><td>1.</td><td colspan="4">• Delineation of micro and secondary nutrient deficient and toxic areas and updating soil fertility map of Madhya Pradesh using GIS.
• Nutrient indexing for forecasting emerging nutrient deficiency in different agro-ecological regions.
• Experimentation on Effect of phasing of Zn and B on yield, content in soybean wheat sequence in Vertisol of Jabalpur, Study the effect of P, S and Mo levels on soybean and chickpea,
• Refinement of critical limit of Zn for rice in field conditions in Bijadandi block of Mandla district
• Study of Micronutrients in Soil-Plant-Animal-Human Continuum in tribal district of Mandla Betul and Jhabua .</td></tr>
<tr><td>2.</td><td colspan="4">• Land degradation mapping of Madhya Pradesh (1:50000) interpretation work using LISS-III satellite data.</td></tr>
<tr><td>3.</td><td colspan="4">• Forecasting of wheat, Mustard, and Cotton acreage and production at state and district level using IRS-P6 AWiFS and LISS-III data
• State level Rice acreage and production was estimated using scan SAR Microwave satellite data</td></tr>
<tr><td>4.</td><td colspan="4">• GIS based Spatial variability maps of generated at different scale</td></tr>
</table>

Name: Er. Manish Patel

Name	Er. Manish Patel			
Date of Birth	20.10.1989			
Designation	Assistant Professor, Farm Machinery & Power Engg.			
Qualification	B. Tech		2011	JNKVV Jabalpur
	M.Tech.		2013	IIT Kharagpur
	Ph.D.		Pursuing	IIT Kharagpur
Positions Held	Assistant Professor		2017	JNKVV Jabalpur
	Associate Professor		---	---
	Professor		---	---
Specialized field	Farm Machinery and Power Machine Vision Mechatronics			
Research Projects undertaken	Nil			
Research Publications	International	National	Technical Bulletins	Book/ chapter
	01	04	01	00
Citations index	Citations : 04		h-Index : 01	RG score: ---
Four Major contributions	1.	Performance Optimization of PTO Driven Generator *(with John Deere India Pvt. Ltd.)*		
	2.	Vehicle integration and prototype development in R&D of tractor industry*(with New Holland India Pvt. Ltd.)*		
	3.	Geometric Properties Measurement of Food Grains using Image Processing (*ASABE's Annual International Meeting, Spokane, Washington, USA)*		

All India Agricultural Students Association (AIASA)

A Voice for Agriculture...

The Governing Board of AIASA confers its National Award

Institute of Excellence Award 2018

to

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur

JNKVV Jabalpur for having a strong research, education and extension services benefiting the students as well as farming community of Madhya Pradesh. JNKVV is also the front-runner in the transfer of technology by various means, which resulted in rapid adoptability of agricultural technology, made wider impact, and carried out activities on empowerment of youth in agriculture. The award is presented based on all India nomination on the occasion of 4th National Youth Convention on "Federating Agri-Youth in Business Group for Remunerative Agriculture" jointly organized by AIASA, ICAR and JNKVV on 15th-16th February, 2019 at Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.).

Dr. N. S. Rathore
DDG (Education)-ICAR,
Chairman, Advisory board-AIASA
Chairman Jury

S. Z. Rahman

Syed Wasifur Rahman,
National President, AIASA &
Co-Chairperson, NYC-2019


Indian Council of Agricultural Research

भाकृअनुप
ICAR

Certificate

SARDAR PATEL OUTSTANDING ICAR INSTITUTION AWARD–2018

(For SAU/DU/CAU category)

is presented to

Jawaharlal Nehru Krishi Vishwavidyalaya

Jabalpur, Madhya Pradesh

16 July, 2019
New Delhi

(T. Mohapatra)
Secretary (DARE) &
Director General (ICAR)

(Narendra Singh Tomar)
Agriculture & Farmers Welfare Minister, GoI
& President, ICAR Society

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

SARDAR PATEL OUTSTANDING ICAR INSTITUTION AWARD- 2018

(For SAU/DU/CAU category)

CITATION

Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh has been conferred Sardar Patel Outstanding ICAR Institution Award- 2018 for University. The University with an area of about 1544 ha of land encompasses six Colleges of Agriculture; one College of Agricultural Engineering; four Zonal Agricultural Research Stations (ZARS); four Regional Agricultural Research Stations; four Agricultural Research Stations (ARS) and twenty Krishi Vigyan Kendras (KVKs) representing 6 agro-climatic zones spread over 25 districts. Since 1964, JNKVV has reported significant advances in teaching, research and extension by creation of strong infrastructure in JNKVV. The University is providing undergraduate and postgraduate education in Agriculture, Horticulture & Agricultural Engineering along with MBA in Agribusiness and Two-year Diploma Course in Horticulture.

JNKVV has produced competent human resource for managing the activities of agriculture and allied sectors and also played a pivotal role in the growth and development of agriculture in the State. The multi-disciplinary research approaches have contributed up to 26% in national basket of Breeder seed and maintains Nucleus seed of 144 varieties of 37 crops under single window system. The State clocked unprecedented around 20 percent growth rate and agricultural production has doubled in the last 10 years. This is the remarkable overall contribution of JNKVV in the Sector of agricultural development. The contribution is remarkably recognized by the confirmation of Krishi Karman Award continuously during last five years and Mahindra Samriddhi National Agricultural Education Award 2015.

Indian Council of Agricultural Research

ICAR

RANKING OF AGRICULTURAL UNIVERSITIES 2018

This is to certify that

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur

is ranked Number **9** *amongst Agricultural Universities*

16 July, 2019
New Delhi

(N.S. Rathore)
Dy Director General (Edn)

(Trilochan Mohapatra)
Director General

JAWAHARLAL NEHRU KRISHI VISHWA VIDYALAYA
JABALPUR – 482 004 M.P. India

Date. 20.2.20

The Social equity committee as constituted by the Vishwa Vidyalaya has gone through the proposal on "**Skill Development to Use Spatial Data for Natural Resources Management in Agriculture**" and found no discrimination on social basis to fulfill objectives of the project.

Social Equity Committee JNKVV, Jabalpur

20/2/20	on leave.	
Dean, Agril. Engineering **Member Secretary**	**Dean Faculty of Agriculture** **Member**	**Director of Ext. Services** **Member**
20/2/2020	20.2.2020	20/2/2020
Registrar **Member**	**Dr. Keerti Tantawai** **Bio Tech. Centre** **Member**	**Director Research Services** **Chairman**

JAWAHARLAL NEHRU KRISHI VISHWA VIDYALAYA
JABALPUR – 482 004 M.P. India

Date- 20.2.20

The Gender equity committee as constituted of the Vishwa Vidyalaya has gone through the proposal on "**Skill Development to Use Spatial Data for Natural Resources Management in Agriculture**" and found no discrimination on gender basis to fulfill objectives of the project.

Gender Equity Committee JNKVV Jabalpur

20/2/20
Dean, Agril. Engineering
Member Secretary

on leave
Dean Faculty of Agriculture
Member

20/2/2020
Director of Ext. Services
Member

20/2/2020
Registrar
Member

20.2.2020
Dr. Anita Babbar
Member

20/2/2020
Director Research Services
Chairman

Detailed Project Report

Under Sub-Component 1B For

Centre of Advanced Agricultural Science and Technology (CAAST) on

SKILL DEVELOPMENT TO USE SPATIAL DATA FOR NATURAL RESOURCES MANAGEMENT IN AGRICULTURE

Under

National Agricultural Higher Education Project (NAHEP)

Submitted to

Agriculture Education Division
Indian Council of Agricultural Research
New Delhi

By

Jawaharlal Nehru Krishi Vishwa Vidyalaya
Jabalpur 482 002 (MP)

2019

CAAST – JNKVV,

National Agricultural Higher Education Project- CAAST on

SKILL DEVELOPMENT TO USE SPATIAL DATA FOR NATURAL RESOURCES MANAGEMENT IN AGRICULTURE

CONTENTS