

Vegetable Research and Development in India: Role of AICRP on Vegetable Crops

In recent years, vegetable sector has emerged as an important component of Indian agriculture. Vegetables have contributed largely towards food and nutritional security of the people, particularly the poor. Vegetable production has made spectacular progress in recent years and touched a new height. India is the second largest producer of vegetables in the world after China, contributing about 14 per cent to the world vegetable production (Table 1). Vegetable production in the country increased from a mere 16.5 million tons in 1950-51 to 162.89 MT in 2013-14. Technological interventions and vegetable hybrids have given tremendous boost to vegetable production. India occupies first position in production in okra second in cauliflower, brinjal, onion, potato and tomato and third in cabbage in the world. In spite of the strides in progress, per capita consumption of vegetable in India is only about 230 g/day/person, which is far below the minimum dietary requirement of 300g/day/person. Forty per cent of the world's malnourished children are in India and 60 per cent of Indian women are anemic. Vegetables being a rich and cheap source of vitamins and minerals, occupy an important place in the food dishes of Indian consumers. It adds taste, aroma, flavor, colour and essence in the meal. The country being blessed with the unique gift of nature of diverse climate and distinct seasons, grows an array of vegetables. About 70 types of vegetables are grown, however, higher emphasis is given to popular vegetables like tomato, brinjal, chilli, okra, pea, cowpea, french bean, cauliflower, cabbage, onion, garlic, cucurbits, carrot, radish and leafy vegetables etc.

Vegetables are considered as one of the most indispensable components of human diet. It contains valuable food ingredients which can be successfully utilized to build up and repair the body. Vegetables are valued for their high carbohydrate, vitamin, mineral and fibre contents. Vegetables make up a significant proportion of the diet of most people and the production of vegetables is a significant factor in ensuring that people have an adequate intake of many essential vitamins, minerals and carbohydrates every day.

Global Scenario:

India is one of the fastest growing economies of the world and is currently the focus of a great deal of international attention. It is the seventh largest country in the world in terms of its geophysical size. Today it has a population of nearly 1.21 billion which makes it the second most populous nation in the world. With current population growth, by 2025, India may even have caught up with China according to the UN.

Table 1: Global Status of Vegetables (2012-13)

Country	Area (million ha)	Production (million tonnes)	Productivity (MT/HA)	% Share of the countries in total global vegetables	
				Area (%)	Production (%)
China	24.56	573.93	23.4	41.66	49.5
India	9.21	162.19	17.6	15.62	14
USA	1.10	35.94	32.7	1.87	3.1
Turkey	1.11	27.81	25.1	1.88	2.4
Iran	0.88	23.49	26.7	1.49	2.0
Egypt	0.77	19.83	25.8	1.31	1.7
Russian Federation	0.79	18.08	22.9	1.34	1.4
Mexico	0.68	13.6	20.0	1.15	1.2
Spain	0.31	12.53	40.4	0.53	1.1
Italy	0.45	12.3	27.3	0.76	1.1
Others	19.1	261.15	13.7	32.39	22.50
Total (World)	58.96	1160.85	19.7		

National Scenario

Indian agriculture has progressed a long way from an era of frequent droughts and vulnerability to food shortages to becoming a significant exporter of agricultural commodities. This has been possible due to persistent efforts at harnessing the potential of land and water resources for agricultural purposes. Indian agriculture, which grew at the rate of about 1 percent per annum before independence, has grown at the rate of about 3 percent per annum in the post independence era.

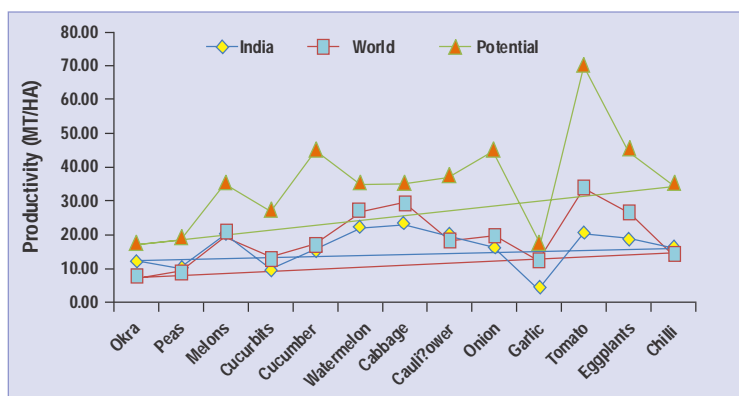


Fig-1: Vegetable productivity scenario (MT/HA)

India is second largest producer of vegetables contributing 12-14% of the global vegetable production next to China in both area and production followed by USA and Turkey. More than 70 types of vegetables are grown but maximum emphasis has been given on popular vegetables like tomato, brinjal, chilli, cauliflower, cabbage, okra, onion, radish, carrot, garden peas and few common cucurbits. Besides these, a large number of minor vegetables are grown in different parts of the country. These minor vegetables are having great scope in export and are fetching very high price in multistar hotels and other tourist restaurants.

World's 16% population is Indian. To feed this population as well as get foreign exchange we must enhance the vertical yield level. Land and water resources are limited and both decreasing day by day. Incessant growth of urbanization, ceaseless fragmentation of land holdings and depleting natural resources are the major challenges before the expansion of any agricultural commodity whether cereals or vegetables. Hence, our attention must be focused on vertical expansion strengthened with the boon of the technology instead of horizontal expansion just by increasing the crop area. No doubt, after the independence we have progressed in all fields of vegetables, though still far behind than potential yield as well as world average production (Table-2). This wide gap can be fulfilled by intensive research, favourable government policies and public & private partnership.

To ensure the nutritional security of the burgeoning population of the country, it is estimated that up to 2020, the country's vegetable demand would be around 196.97 million tonnes. To achieve this target, it is *sine qua non* to integrate the various technologies right from production to post-harvest.

Table 2: Vegetable Productivity Scenario (t/ha)

Crops	India (average)	World (average)	Potential productivity	Maximum productivity
Tomato	20.7	33.8	60-80	70.45 (USA)
Eggplants	18.6	26.5	40-50	34.70 (Japan)
Chilli	10.18	15.6	30-40	44.50 (Spain)
Okra	12.0	7.8	15-20	17.78 (Jordan)
Peas	9.5	8.35	18-20	20.00 (Lithuania)
Melons	20.76	20.95	30-40	45.83 (Cyprus)
Cucurbits	10.92	12.97	25-30	41.33 (Israel)
Cucumber	15.67	16.98	40-50	67.67 (Korea)
Watermelons	20.20	27.13	30-40	40.96 (Spain)
Cabbage	22.9	29.4	30-40	42.59 (Japan)
Cauliflower	19.6	18.1	35-40	45.25 (New Zealand)
Onion	16.0	19.4	40-50	60.33 (Korea)
Garlic	5.32	12.37	15-20	23.23 (Egypt)

During the year 2013-14 a total of 162.89 million tonnes vegetables have been produced from an area of 9.39 million hectares accounting for productivity of 17.35 t/h as against total production of 18.47 million tonnes with a productivity of 6.64 t/ha from the area of 2.78 million hectares in the year 1961. The vegetable production has registered a growth rate of 5.04 per cent per annum. During the year 2011-12 the availability of vegetables was 230 g per capita per day which was only 205 g during the year 2000-01.

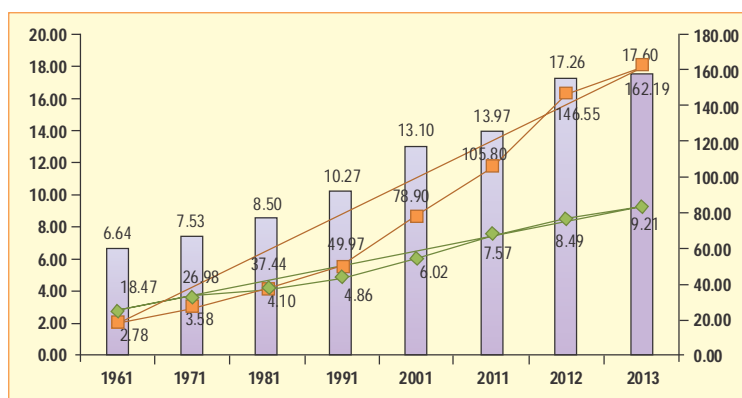


Fig.-1 Area, Production and Productivity under vegetables

Among all the vegetables, tomato and brinjal (excluding potato and onion) have maximum area and production, because these two crops are widely grown in all parts of the country. Okra, pea and cauliflower are the next choice after tomato and brinjal (Table-3).

Table 3: Cropwise Area, Production and Productivity (2012 – 13)

Crops	Area (000 ha.)	Production (000 MT)	Productivity (MT/ha)
Tomato	879.63	18226.64	20.72
Brinjal	722.07	13443.59	18.62
Okra	530.79	6350.27	11.96
Pea	420.90	4006.17	9.52
Cauliflower	402.20	7886.73	19.61
Cabbage	372.36	8534.23	22.92
Topica	206.96	7236.59	34.97
Radish	170.30	2410.78	14.16
Beans	123.51	1268.90	10.27
Sweet Potato	111.76	1132.36	10.13
Bottle gourd	105.44	1984.14	18.82
Bitter gourd	83.22	940.15	11.30
Chilli (Dried)	76.23	1202.94	15.78
Water Melon	80.59	1789.23	22.20
Carrot	64.27	1144.54	17.81
Cucumber	40.90	640.99	15.67
Muskmelon	41.82	868.02	20.76
Pumpkin	16.17	372.82	23.06
Capsicum	29.14	153.35	5.26
Pointed gourd	13.82	224.27	16.23
Potato	1992.21	45343.59	22.76
Onion	1051.53	16813.01	15.99
Other Vegetables	1737.16	21310.46	12.27
All India	9205.19	162186.57	17.62

Decadal growth of agriculture, major cereals and Vegetables

After Independence, the country witnessed the Green Revolution, which accelerated the agriculture production. In the seventh and eight decade of the 19th Century, the production of wheat increased at the rate of 8.14% and 5.30% per annum and simultaneously paddy with 2.65% and 3.75%. This increase in production resulted in self sufficiency in food grain production. Simultaneously not much attention was paid on the vegetable production, even though its production rose rapidly. Since 1961-2013 area under rice crop increased 1.17, wheat 2.18 and vegetable 3.31 folds, while production of rice increased 2.93, wheat 8.42 and vegetable 8.78 folds.

The maximum vegetable production growth (Table-4), noticed during seventies, may be due to increase in area, introduction of high yielding varieties and availability of resource like fertilizer, irrigation and pesticides. Since then the vegetable production growth rate increases on sustainable basis.

Table 4: Decadal growth rate of crops and Agriculture

Decade	Paddy	Wheat	Vegetable	Agriculture including livestock
1961-70	2.65	8.14	4.57	2.53
1971-80	3.75	5.30	5.01	3.77
1981-90	3.99	4.99	3.13	4.67
1991-2000	1.47	4.53	4.14	3.29
2001-2010	2.58	0.77	6.46	0.31
2011	9.72	7.51	3.61	8.8
2012	-1.24	9.22	9.59	3.9

Regional Production Patterns in Vegetables

The state-wise vegetable area as percentage of gross cropped area revealed that it was highest in W.B. (15%), followed by Uttar Pradesh and Bihar ((10%). At national level, vegetables occupied less than 3 % of the total cropped area. The regional distribution of area and production showed their higher concentration in the eastern states, viz. Uttar Pradesh, West Bengal, Odisha and Bihar. These together accounted for 50 per cent of the area and output in the country.

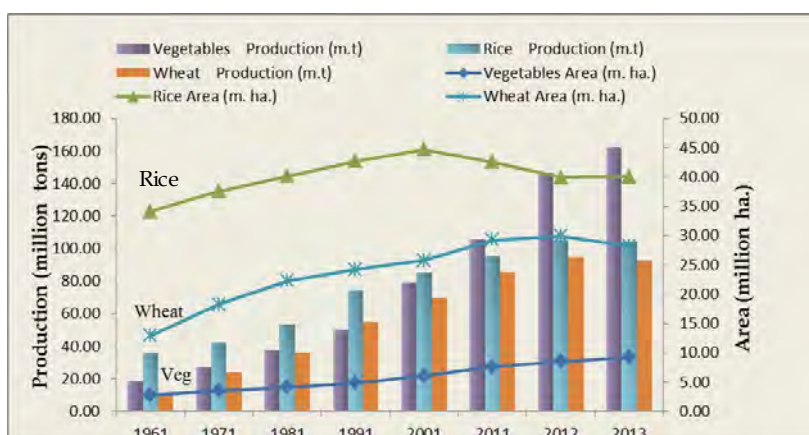


Fig-3: States Share (%) in vegetable cultivation and production (2012-13)

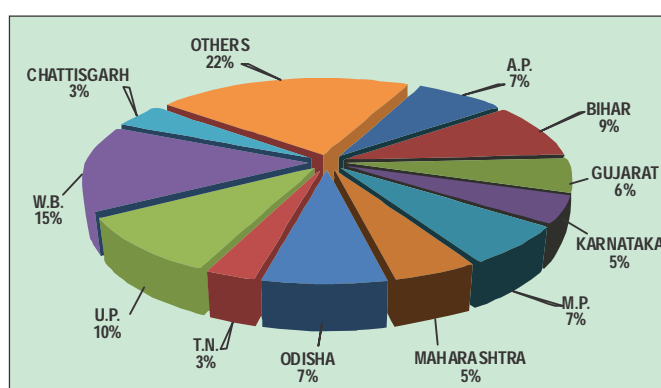
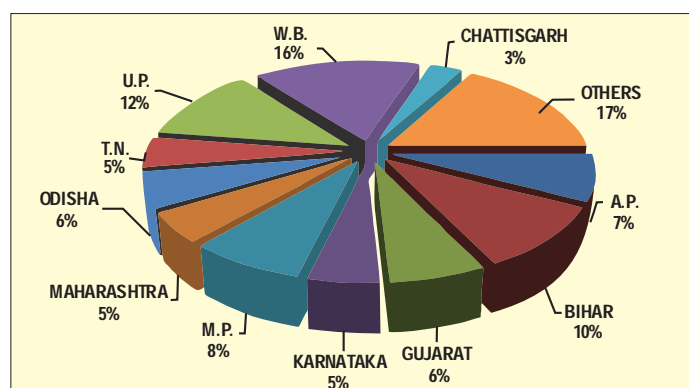


Fig. 4: Vegetable production share (%) of leading states 2012-13

Fig. 5: Vegetable Area share (%) of leading states 2012-13

Projected Demand of the vegetables:

Presently most of the states are in deficit of their vegetable requirement. A few states like West Bengal, Haryana, Himachal Pradesh, Sikkim and Chattisgarh are producing sufficient quantity of vegetables to fulfill the requirements of their population.

The demand of vegetables has been increasing fast in the urban/ rural areas with a gradual rise in standard of living coupled with development of communication and transport facilities. The vegetable requirement by 2015 will be 182.84 million tonnes, by 2020 196 million tonnes and upto 2030 the requirement will be 228.59 million tonnes for the population increasing at the rate of 1.5 per cent annually. Since 2001-2002 the area over the year 1999-2000 increased approximately 41.74%, simultaneously the increase in production has enhanced 61.35%.

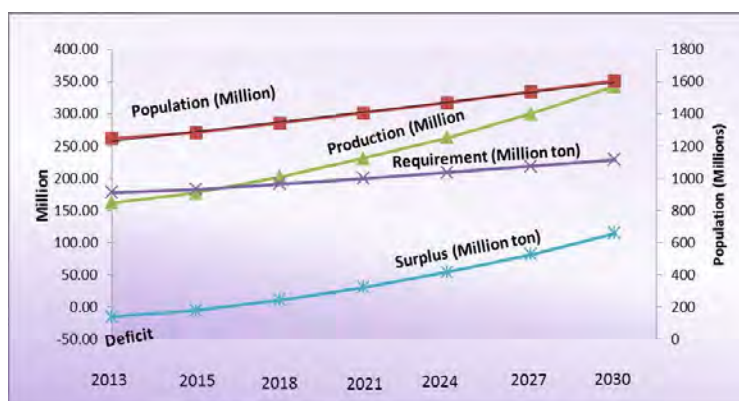


Fig. 6. Projected population and demand

Table 5: State-wise Projected demand of vegetables in subsequent years (000 mt)

States	Years			
	2015	2020	2025	2030
Andaman & Nicobar	57.40	61.84	66.62	71.77
Andhra Pradesh	12791.70	13780.29	14845.29	15992.59
Arunachal Pradesh	208.89	225.04	242.43	261.16
Assam	4709.21	5073.16	5465.23	5887.61
Bihar	15683.33	16895.40	18201.15	19607.81
Chandigarh	159.35	171.66	184.93	199.22
Chhattisgarh	3858.74	4156.96	4478.23	4824.32
D & N Haveli	51.80	55.80	60.12	64.76
Daman & Diu	36.70	39.54	42.59	45.88
Delhi	2531.16	2726.78	2937.52	3164.54
Goa	220.24	237.26	255.60	275.35
Gujarat	9123.07	9828.13	10587.69	11405.95
Haryana	3830.47	4126.51	4445.42	4788.98
Himachal Pradesh	1035.92	1115.98	1202.22	1295.14
Jammu & Kashmir	1895.96	2042.48	2200.33	2370.38
Jharkhand	4709.21	5073.16	5465.23	5887.61
Karnataka	9235.94	9949.73	10718.68	11547.07
Kerala	5044.38	5434.23	5854.21	6306.65
Lakshadweep	9.73	10.49	11.30	12.17
Madhya Pradesh	10968.41	11816.09	12729.29	13713.06
Maharashtra	16977.88	18290.00	19703.53	21226.29
Manipur	411.22	443.00	477.23	514.12
Meghalaya	447.82	482.43	519.71	559.88
Mizoram	164.84	177.58	191.30	206.08
Nagaland	299.24	322.37	347.28	374.12
Odisha	6337.62	6827.42	7355.07	7923.50
Pondicherry	188.02	202.55	218.20	235.07
Punjab	4185.70	4509.18	4857.67	5233.09
Rajasthan	10367.61	11168.86	12032.04	12961.92
Sikkim	91.81	98.91	106.55	114.79
T.N.	10899.12	11741.45	12648.88	13626.43
Tripura	554.64	597.50	643.68	693.43
Uttanchal	1528.49	1646.62	1773.88	1910.97
Uttar Pradesh	30153.79	32484.19	34994.70	37699.23
West Bengal	13801.28	14867.90	16016.95	17254.81
India	182842.20	196972.97	212195.83	228595.18

To achieve the future targets approximately 7% annual growth of vegetable will be required. India is endowed with the diverse climate and can grow largest number of vegetable crops compared to any other country of the world and as many as 61 annual and 4 perennial vegetable crops are commercially cultivated.

Genesis of the AICRP (Vegetable Crops)

The All India Coordinated Research Project on Vegetable Crops (AICRP-VC) was initiated under the aegis of ICAR during the fourth five-year plan in 1970-71, to provide a national grid for multi-location testing of the vegetable technologies developed by various research institutes and state agricultural universities. The Headquarter of the project was at the Division of Vegetable Crops, Indian Agricultural Research Institute (IARI), New Delhi and the Project Coordinator (Vegetable Crops) joined the project in July 1971. Looking at its important role in balanced nutrition, the council upgraded its status to the level of Project Directorate in 1986 and its Headquarter was shifted to Varanasi in the year 1992. Considering the excellent all round performance of Project Directorate, the council further raised its esteemed status as Indian Institute of Vegetable Research during April, 1999. In the mean time the AICRP (VC) programme was managed by the Director of the Institute. From February, 2010 the AICRP (VC) has been endowed with the post of Project Coordinator to look after the programme of the coordinating centres. In the subsequent phase of development, several new centres were included under the project. The basic aim behind these new inclusions was to cover broadly classified eight agro-climatic zones of India under the AICRP trials. However, Kovilpatti centre of Tamil Nadu Agriculture University was deleted during the seventh five year plan. With the shifting of Project Directorate from IARI, New Delhi to Varanasi in 1992, Varanasi also became one of the main centres of the project. The XI Plan EFC mainly focused on better utilization of manpower and resources, consequently NSP (Veg.) and AICRP(VC) were merged together. All the centres under NSP (Veg.) except IARI (R.S.), Karnal were located at a place where AICRP (VC) was also operational. Thus, at present, the AICRP (VC) programmes are carried out at 29 designated centres which includes 23 State Agricultural Universities, 1 Central Agricultural University and 5 ICAR Institutes including IIVR, Varanasi. Apart from it, 25 voluntary centres are also associated with the programme. List of the planwise status of AICRP(VC) centres is given in Table-6.

Mandate

- To collect, evaluate and conserve the vegetable biodiversity that exists in different agro-climatic zones of the country
- To develop improved varieties and hybrids resistant to biotic and abiotic stresses through multi-locational testing of mandated vegetable crops
- To develop appropriate production technology for selected vegetable crops
- To develop and standardize appropriate protection technology for major diseases and insect-pests
- To standardize the seed production technology of mandated vegetable crops
- To monitor breeder seed production of released / notified varieties
- To act as a national repository of scientific information relevant to vegetable crops

Objectives

- To provide scientific leadership in coordinated network research for solving location specific problems of production and to monitor breeder seed production of released/notified varieties
- To collect, evaluate and conserve the vegetable biodiversity that exists in different agro-climatic zones of the country

- To identify improved varieties and hybrids resistant to biotic and abiotic stresses through multi-locational testing of mandated vegetable crops
- To develop appropriate production technology for selected vegetable crops
- To develop and standardize appropriate protection technology for major diseases and insect-pests
- To standardize the seed production technology of mandated vegetable crops
- Production of adequate quantity of breeder seed of vegetables as per the national requirements
- To provide technical supervision for the breeder seed production of released varieties and parental lines of vegetable crops

In the beginning, the AICRP (Vegetable Crops) was started with 15 centres including 7 main and 8 subcentres. However Tamil Nadu Agriculture University, Kovilpatti, T.N. delinked and transferred to TNAU, Coimbatore. In later phases of developments 14 new centres were added to cover all the agroclimatic zones of the country having wide variation in their physiography.

Table 6 : Planwise initiation of AICRP (Vegetable Crops) centres

Centres	Initiated in plan/ year
Main centres	
1. Indian Agricultural Research Institute, New Delhi	IV Plan (1971)
2. IARI Regional Vegetable Research Station, Katrain, Kullu, Himachal Pradesh	IV Plan (1971)
3. Indian Institute of Horticultural Research, Bangalore, Karnataka	IV Plan (1971)
4. Punjab Agricultural University, Ludhiana, Punjab	IV Plan (1971)
5. Rajendra Agricultural University, Sabour, Bihar	IV Plan (1971)
6. Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra	IV Plan (1971)
7. Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu	IV Plan (1971)
Sub Centres	
8. Govind Ballabh Pant University of Agriculture & Technology, Pantnagar, Uttarakhand	IV Plan (1971)
9. Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, U.P.	IV Plan (1971)
10. Assam Agricultural University, Jorhat, Assam	IV Plan (1971)
11. Odisha University of Agriculture & Technology, Bhubaneswar, Odisha	IV Plan (1971)
12. Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, M.P.	IV Plan (1971)
13. Sher-E- Kashmir University of Agricultural Sciences, Srinagar, J&K	IV Plan (1971)
14. *Andhra Pradesh Agricultural University, RS, Lam, Guntur, A.P.	IV Plan (1971)
15. Rajasthan Agricultural University, Durgapura, Jaipur, Rajasthan	IV Plan (1971)
Tamil Nadu Agriculture University, Kovilpatti, T.N. (During VII Plan centre was dropped)	IV Plan (1971)
Addition of participatory centres in subsequent phase of AICRP development	
16. Bidhan Chandra Krishi Vishwavidyalaya, Kalyani, W.B	V Plan (1974)
17. Marathwarda Krishi Vishwavidyalaya, Ambajogai, M.S.	V Plan (1974)
18. Haryana Agricultural University, Hisar, Haryana	V Plan (1974)
19. Narendra Dev University of Agric. and Tech., Faizabad, U.P.	VI Plan (1980)
20. Kerala Agricultural University, Vellanikkara, Kerala	VI Plan (1980)
21. Dr. Y.S.Paramar University of Horticulture & Forestry, Solan, H.P.	VII Plan (1985)
22. * Andhra Pradesh Agricultural University, Hyderabad, A.P.	VII Plan (1985)
23. Gujarat Agricultural University, Junagadh, Gujarat	VII Plan (1985)
24. Indian Institute of Vegetable Research, Varanasi (Head quarter)	VII Plan (1992)
25. University of Agricultural Sciences, Dharwad, Karnataka	VIII Plan (1992)
26. Indira Gandhi Krishi Vishwavidyalaya, Raipur, C.G.	VIII Plan (1992)
27. IARI (Reg. Station), Karnal (After the merger of AICRP-VC with NSP)	XI Plan (2008)
28. CAU, Pasighat, Arunachal Pradesh	XI Plan (2008)
29. Rajendra Agricultural University, Samastipur, Bihar	XI Plan (2008)

* Now AICRP (VC) have been transferred to YSR Andhra Pradesh Horticultural University, Hyderabad

Co-opting Centres

Apart from twenty nine-centes, 28 co-opting centres are also associated with the programme on voluntary basis. Among the Co-opting centres 13 centres are SAU's based, 11 centres are ICAR based and rest four are under public research organizations. List of the co-opting centres under different components is given in Table 7.

Table 7: Co-opting Centres

SAU based Co-opting centres	ICAR institute based Co-opting centres	Other Co-opting Centres
1. PDKV, Akola	1. ICAR Research Complex for NEH, Barapani	1. DIBER, Pithoragarh
2. SHIATS (AAI), Allahabad	2. CITH, Srinagar	2. NHRDF, Nasik
3. AAU, Anand	3. ICAR Research Complex, Goa	3. NHRDF, Karnal
4. KKV, Dapoli	4. NBPGR, New Delhi	4. MSSC, Akola
5. SKUAS&T, Jammu	5. CARI, Portblair	
6. NAU, Navsari	6. ICAR-RCER, RC Ranchi	
7. CSK HPKV, Palampur	7. ICAR Research Complex., Lembuchera, Tripura	
8. PJNCARI, Pondicherry	8. VPKAS, Almora	
9. UUH&F, Ranichauri	9. CIAH, Bikaner	
10. UAS, Bangalore	10. IIHR, R. S., Bhubaneswar	
11. HCRI, TNAU, Perriyakulum	11. IASRI, New Delhi	
12. SKDAU, Jagudan		
13. SASRD, Nagaland University, Medziphema,		

Agro-climatic Zones

Nature has blessed the country with diverse climate, varying topography and distinct flora and fauna. The soils and climatic conditions of a region largely determine the cropping pattern and crop yields. Reliable information on agro ecological regions homogeneity in soil site conditions is the basic to maximize agricultural production on sustainable basis. This kind of systematic approach may help the country in planning and optimizing land use and preserving soils, environment.

India exhibits a variety of landscapes and climatic conditions those are reflected in the evolution of different soils and vegetation. There also exists a significant relationship among the soils, land form climate and vegetation. Keeping these facts in mind whole AICRP (Vegetable Crops) programme has been taken under eight mega agro-climatic zones of the country. List of the agro-climatic zones and states and their parts belonging into the particular zone has been given in the Table 8.

Table 8 : Agro-climatic zones of AICRP (Vegetable Crops)

Agro-climatic zone	States
I. Humid Western Himalayan Region	Jammu & Kashmir (J&K), Himachal Pradesh and Uttarakhand
II. Humid Bengal - Assam Basin	West Bengal and Assam
III. Humid Eastern Himalayan and Bay Islands	Sikkim, Meghalaya, Manipur, Nagaland, Mizoram, Tripura, Arunachal Pradesh and Andaman & Nicobar Islands
IV. Sub-Humid Sutlej Ganga Alluvial Plain	Punjab, U.P., Bihar and Jharkhand
V. Sub-Humid to Humid Eastern and South Eastern Uplands	Chhatisgarh, Odisha and Andhra Pradesh.
VI. Arid Western Plain	Rajasthan, Gujarat, Haryana and Delhi
VII. Semi Arid Lava Plateaux and Central High Lands	Madhya Pradesh, Maharashtra and Goa
VIII. Humid to Semi - Arid Western Ghats and Karnataka Plateaux	Karnataka, Tamil Nadu, Kerala and Pondicherry

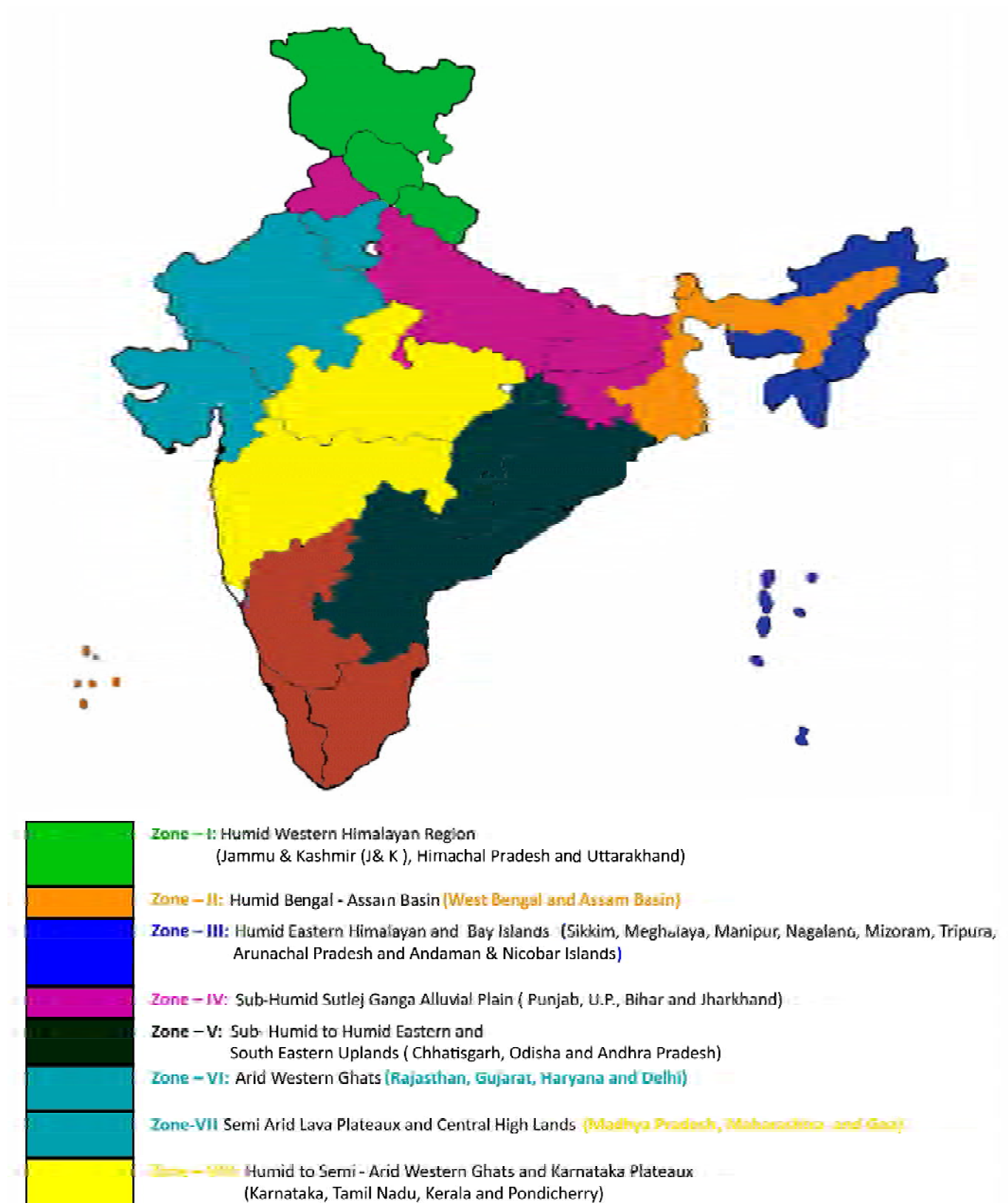


Fig. 8: Agro-climatic zones in India under AICRP on Vegetable Crops

Zone and State wise location of Coordinating Centres

AICRP (VC) may be considered as one of the most well knitted research programmes in the country. The vegetable research stations under the programme centres have been selected from temperate areas like Jammu & Kashmir to Coastal areas like Kerala. In XI plan its one centre has been created at Pasighat in Arunachal Pradesh. Thus each state has at least one research centre under the umbrella of AICRP (VC). Zone-wise list of the coordinating centres under different states has been given in the Table-9.

Table-9 : Zone and State wise list of Coordinating Centres

Agro-climatic Zones	States	Main & Sub Centres	Voluntary Centres	Total
I	Himachal Pradesh	Katrain, Solan	Palampur	3
I	Jammu & Kashmir	SKUAT(K) Srinagar	CITH, Jammu	3
I	Uttarakhand	Pantnagar	Pithoragarh , Ranichauri, Almora	4
II	Assam	Jorhat	-	1
II	West Bengal	Kalyani	-	1
III	Andman & Nicobar	-	CARI, Port Blair	1
III	North East States	Pasighat	Barapani, Agartala, Medziphema	4
IV	Bihar	Sabour, Samastipur	-	2
IV	Jharkhand	-	Ranchi	1
IV	Punjab	Ludhiana	-	1
IV	Uttar Pradesh	Varanasi, Faizabad, Kanpur	Allahabad	4
V	Andhra Pradesh	Hyderabad, Lam	-	2
V	Chhatisgarh	Raipur	-	1
V	Odisha	Bhubaneswar	RS, IIHR, Bhubaneswar	2
VI	Delhi	IARI	NBPGR, IASRI	3
VI	Gujarat	Junagadh	Anand , Navsari, Jagudan	4
VI	Haryana	Hisar, IARI(RS), Karnal	Karnal (NHRDF)	3
VI	Rajasthan	Durgapura	CIAH	2
VII	Goa	-	ICAR Research Complex, Goa	1
VII	Madhya Pradesh.	Jabalpur	-	1
VII	Maharashtra	Rahuri, Parbhani	Akola, Dapoli, Nasik (NHRDF), MSSC (Akola)	6
VIII	Karnataka	Hessaraghatta, Dharwad (UHS, Bagalkot)	UAS, Bangalore	3
VIII	Kerala	Vellanikkara	-	1
VIII	Pondicherry	-	PJNCOA&RI, Karaikal, Pondichery	1
VIII	Tamil Nadu.	Coimbatore	Periyakulam East	2
	Total	29	28	57

Human Resource

Human Resource Planning is a mandatory part of every programme. To undertake the problem oriented applied research and testing of the technologies, under various broad agroclimatic conditions with a view to solve the national problem in the shortest possible time needs specialized manpower. So, at the 29 coordinating centres a total of 77 Scientists are working in different disciplines along with 83 technical, 1 Administrative and 10 Supporting staffs (Fig. 9) throughout the country. The discipline-wise details of the scientists are depicted in Table 10.

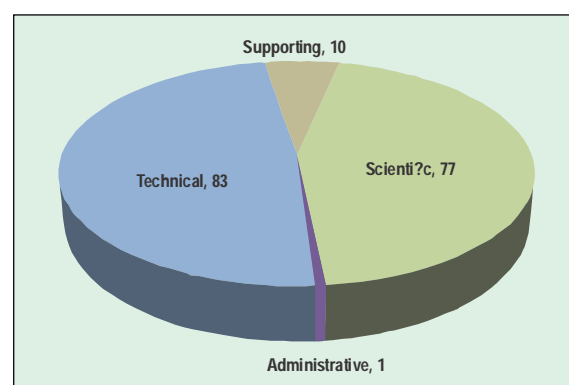


Fig. 9 : Total Positions sanctioned under AICRP (VC) programme

Table 10: Discipline-wise Scientific Positions-AICRP-VC (As sanctioned)

Post	Number	Centres
Sr. Breeder	5	Ludhiana, Rahuri, Jabalpur, Bhubaneswar, Solan
Asstt. Breeder	22	Parbhani, Bhubaneswar, Coimbatore, Dharwad, Durgapura, Faizabad, Hisar, Hyderabad, Jabalpur, Jorhat, Junagadh, Kalyani, Kalyanpur, Lam, Pantnagar, Raipur, Rahuri, Sabour, Solan, Srinagar, Vellanikkara, Pasighat
Asstt. Agronomist	15	Bhubaneswar, Coimbatore, Dharwad, Durgapura, Hisar, Faizabad, Hyderabad, Jabalpur, Junagadh, Jorhat, Kalyanpur, Pantnagar, RAU, Pusa, Srinagar, Vellanikkara
Asstt. Pathologist	15	Parbhani, Bhubaneswar, Coimbatore, Hyderabad, Junagadh, Kalyanpur, Lam, Ludhiana, Raipur, Rahuri, Sabour, Solan, Vellanikkara, RAU. Pusa, Passighat
Asstt. Entomologist	5	Ludhiana, Rahuri, Sabour, Solan, Hyderabad
Asstt. Virologist	2	Ludhiana, Kalyani
Bacteriologist	1	Durgapura
Asstt. Nematologist	1	Ludhiana
Boichemist	1	Ludhiana
Sr. Scientist/ Sr. Seed Production Officer	10	Bhubaneswar, Coimbatore, Jabalpur, Kalyanpur, Lam, Ludhiana, Pantnagar, Raipur, Rahuri, Solan
Total	77	

Major Activities

AICRP (VC)- A National grid for vegetable research in the country

All India Coordinated Research Project on Vegetable Crops provides a national grid among all the organizations including government, state agricultural universities and private concerns working in the field of vegetable research. It is considered as one of the most vibrant research programmes in the country. The AICRP (VC) encourages the research activities through guiding and providing all the research facilities to the people/ organizations working in vegetable field. It works as the power house for vegetable research.

All India Coordinated Research Project (Vegetable Crops) operates on the national basis through interdisciplinary multi-location evaluation of the proven results of applied value, which are not only highly influenced by the several environmental factors but their successful adoption in a particular region depends on the socio-economic structure of that region. Therefore, AICRP (Vegetable Crops) provides scope and opportunity for wider evaluation of experiments under a wide range of agro-ecological conditions and socio-economic background, which helps in the successful application of results of agricultural research. While undertaking the basic, strategic and applied research for developing technology to enhance productivity of vegetable crops, it has to provide scientific leadership in coordinated network research for solving location-specific problems of production and to monitor breeder seed production of released / notified varieties. The centres of research under this project are located both in the agricultural universities and the ICAR institutes. Thus, the project also provides functional linkages between the institutions and the scientists working on related problems.

Multilocational Testing

The first major task of the All India Coordinated Research Project on Vegetable Crops (AICRP-VC) has been multilocational testing of the vegetable varieties/ hybrids developed by different research institutes, at the various centres in order to identify varieties suitable for specific agro climatic zones. Later, research was undertaken on agro-techniques, like plant population density, fertilizer requirements and chemical weed control. Subsequently, research programmes were also undertaken on chemical control of diseases and insect pests. Initially, only 14 vegetables were covered under the research programme, however, with the subsequent addition of more crops, the number of crops covered under the project is presently 24. Still, major emphasis is laid on 16 important vegetables, which include tomato, brinjal, chilli, cauliflower, cabbage, vegetable pea, cowpea, bottle gourd, bitter gourd muskmelon, watermelon, okra, french bean, pumpkin, carrot and radish.

Problem oriented Applied Research

The faster the advance of basic knowledge, the greater is the productivity of applied research. Static basic research would mean diminishing returns in applied research because of increasing cost of innovation within the framework of existing knowledge. Eventually, technical change could stagnate until new knowledge emerges from basic research. The question arises as to the proper mix of basic and applied research that an agricultural research institute should conduct. This depends on a number of factors, such as the institute's mandate and the level of economic development of the country.

The Second main task of the AICRP (VC) is to undertake the problem oriented applied research and testing of the technology under different agro-climatic conditions with a view to solving the national problems. Improve the cost effective production and protection technologies.

Quality Seed Production

The Breeder Seed Production is one of the major tasks of the AICRP (VC) to maintain seed production chain at the national level. A large number of varieties of different vegetables have been released for cultivation in different regions of India. The seed agencies in the public and the private sectors are contributing significantly to the overall improvement in vegetable productivity by providing good quality seeds. The National Seeds Corporation (NSC), State Seed Corporations and private seed agencies are responsible for providing quality seeds for centrally released varieties at the national level.

Organizing Workshop

Organization of workshop has become an integral activity of this project to discuss the results of the experiments and to formulate future experimental plans at various participatory centres. The first workshop was organized in Feb., 1971 at the IARI under the leadership of Dr. Vishnu Swaroop. Until 1992 often workshops were organized biennially. After the existence of Project Directorate of Vegetable Research (PDVR) workshops were organized annually. Till now, thirty-two workshops/ group meetings and one Mid Term Review Meeting have been organized (Table 11) in which active workers associated with different research projects participated and very vital recommendations have been made on various aspects.

Table 11: List of workshops/ group meetings held under AICRP (Vegetable Crops) since 1971

Group Meeting	Venue	Period
I.	Indian Agricultural Research Institute, New Delhi	Feb, 5-6, 1971
II.	Punjab Agricultural University, Ludhiana (Punjab)	May, 11-13, 1972
III.	University of Agricultural Sciences, Bangalore (Karnataka)	April, 8-11, 1975
IV.	Odisha University of Agriculture and Technology, Bhubaneswar (Odisha)	May, 9-13, 1977
V.	Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)	March, 5-9, 1979
VI.	Mahatma Phule Krishi Vidyapeeth, Pune (M.S.)	June, 23-27, 1981
VII.	CCS Haryana Agricultural University, Hisar (Haryana)	May, 16-19, 1983
VIII.	Rajendra Agricultural University, BAC, Sabour (Bihar)	June, 6-10, 1985
IX.	Narendra Dev University of Agriculture and Technology (U.P.)	Jan., 13-16, 1987
X.	Kerala Agricultural University, Vellanikkara , (Kerala)	Aug., 20-23, 1988
XI.	Dr. Y.S. Parmar University of Horticulture & Forestry, Solan (H.P.)	June, 4-7, 1990
XII.	A.N.G.R. Andhra Pradesh Agricultural University, Hyderabad (A.P.)	Jan., 6-9, 1992
XIII.	Jawahar Lal Nehru Krishi Vishwavidyalaya, Jabalpur (M.P.)	Jan., 6-9, 1993
XIV.	Indira Gandhi Krishi Vishwavidyalaya, Raipur (M.P.)	Feb., 2-5, 1995
XV.	Banaras Hindu University, Varanasi (U.P.)	Mar., 25-28, 1996
XVI.	Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)	May, 28-31, 1997
XVII.	Mahatma Phule Krishi Vidyapeeth, Rahuri, Pune Campus (M.S.)	June, 8-11, 1998
XVIII.	Punjab Agricultural University, Ludhiana (Punjab)	Oct., 11-14, 1999
XIX.	Indian Institute of Vegetable Research, Varanasi (U.P.)	Jan., 15-18, 2001
XX.	Kerala Agricultural University, Vellanikkara (Kerala)	April, 9-12, 2002
XXI.	Gujarat Agricultural University, Anand (Gujarat)	May, 25-28, 2003
XXII.	ANGRAU, Hyderabad (A.P.)	May, 27-30, 2004
XXIII.	BCKV, Kalyani, West Bengal	April ,16-19, 2005
XXIV.	UAS, Dharwad (Karnataka)	April, 22-24, 2006
XXV.	CCS HAU, Hisar (Haryana)	May, 3-6, 2007
XXVI.	Odisha University of Agriculture and Technology, Bhubaneswar	Feb,23-27,2008
XXVII.	Tamil Nadu Agricultural University, Coimbatore (T.N.)	Feb,12-15,2009
XXVIII.	Indian Institute of Horticultural Research, Bangalore (Karnataka)	Jan., 16-19, 2010
XXIX.	Junagadh Agricultural University, Junagadh (Gujarat)	Jan., 27-30, 2011
XXX.	G.B.P.U.A. & T. Pantnagar, (Uttarakhand)	Jan., 13-16, 2012
XXXI.	CSK HPKV, Palampur (H. P.)	May, 2-5, 2013
—	Mid Term Review Meeting, NSC Complex, Pusa, New Delhi	Dec. 17-18, 2013
XXXII.	IGKV, Raipur (C.G.)	June 24-27, 2014