

XXI-Workshop

Venue : Gujarat Agricultural University, Anand

Date : 25th - 28th May, 2003

Collection, evaluation and conservation of germplasm

Promising lines of germplasm identified by different centres has been given in table

Table 1 : Promising lines identified

Crops	Source	Promising lines
Amaranths	Vellanikkara	VKA-26, VKA-16
	Jorhat,	Strain-16 (816 g), Strain-13 & 17 (650 g & 419 g)
	NBPGR-Shimla	IC-278923, IC-313272, IC-279971
Brinjal	HARP-Ranchi	HAB-884, HAB-894
	IARI	677-10-8, BB-46, 586-4,480-1, 624-5
	Bhubaneshwar	BBSR-135 (Dhenkenal), BBSR-127 (Posala)
	NBPGR-New Delhi	EC-384565, EC-379246, IC-90806 (High yield) IC-90922, IC-90047, EC-384565 (<i>Phomopsis</i> blight)
Bitter gourd	Vellanikkara	VKB-125, VKB-130, VKB-127
	Jabalpur	JMC-14-2 (22fruits/plant), JMC-14-3 (24fruits/plant)
	NBPGR-Thrissur	IC-256226(262 fr./ pl- <i>M.charanatia</i> var. <i>muricata</i>),
Bottle gourd	Rahuri	IABG-43, 42, 25 & 26,
Early Cauliflower	IIVR, Varanasi	IIVRCE-1(750 g/curd), IIVRCE-2 (680 g/curd), DCH-41-4 (633 g/curd, 17 x 16 cm)
	Sabour	91-2, 95-3, 91-1, 93-2, 84-3
Early Late Cauliflower	IIVR, Varanasi	IIVRCE-2 (650 g/curd), JBT/BS 23/95 (625 g/curd)
Mid Cauliflower	IIVR, Varanasi	IIVRCM-12 (974 g/curd), IIVRCM-11 (870 g/curd), Pusi-2 (950 g/curd), Pusi-8 (900 g/curd)
Chilli	IIVR, Varanasi	CCA-4261, CCA-4757 (cms lines), MS-12 (gms line)
	Jorhat	Jati Long (146 q/ha), Round Chilli (100 q/ha) - resistance to fruit rot and bacterial wilt
	Lam	Parampet Local, Nandyal Local
	NBPGR- New Delhi	NIC-19943, EC-382081(Both having high Capsaicin content) MN-57, N-1615, NIC-20893(> 25 % Oleoresin content)
Cucumber	HARP, Ranchi	HAC-71, HAC-31, HAC-26
Lablab bean	IIVR, Varanasi	Dolichos 141A, Sem-7, RHRWL-2
	HARP, Ranchi	CHDB-9, CHDB-79, CHDB-35, CHDB-14
French bean	Pantnagar	PFB-2, PFB-7, PFB-628, PCPGR-1614, PCPGR-1622 (All bush types)
	NBPGR, Shimla	IC-311085, IC-274526, IC-313279, IC-280000 (All bush types); IC-311091, IC-313319, IC-274529, IC -313319 (All pole types)
Garlic	NRC (O & G)	Acc-336, Acc-345, Acc-360, Acc-355, Acc-341
	NHRDF, Karnal	Coll. No.363 (tolerance to <i>Stemphylium</i> blight & Purple blotch), Coll. No.367, Coll. No.368 (High yielder)
Ivy gourd	IIVR, Varanasi	VRK-79, VRK-81, VRK-84, VRK-85, VRK-87, VRK-88
	Vellanikkara	CG-23, CG-27, CG-9 (Tolerance to mosaic)

Crops	Source	Promising lines
Musk melon	PAU, Ludhiana	PSDPM-1-7-50 (1250 g/fruit), IC-32057, IC-267370 - All have high TSS. IC-267372, IC-320154, IC-320167 (All are of Early maturity group)
Pointed gourd	IIVR, Varanasi	IIVRPG-1, IIVRPG-2, IIVRPG-101, IIVRPG-83 IIVRPG-105 (Seedless/Parthenocarpic line)
	HARP, Ranchi	HAP-5, HAP-3, HAP-22, HAP-38, HAP-39, HAP-24
	Faizabad	Narendra Parval-701, Narendra Parval-602
	Sabour	Rajendra Parval-1, Rajendra Parval-2, 94-1
Okra	IIVR, Varanasi	<i>Abelmoschus angulosus</i> , <i>A. manihot</i> - Tolerant to powdery mildew, YVMV, OELCV; <i>Abelmoschus angulosus</i> - Tolerant to mite
	Bhubaneswar	Acc-49, Acc-52 - Both tolerant to YVMV
	NBPGR, Thrissur	TCR-899, EC-305749C4, EC-306722A, EC-306722A4 (All high yielder) IC-264697, IC-264736, EC-305749, EC-305749C1, EC-306741A2 (All long duration fruiting) <i>A. angulosus</i> (IC-203863-24.7fruit/pl.)
Onion	NRC (O & G)	W-418, W-414, W-415, W-430, W-438, W-440, W-441 (All high yielder) W-427, W-425, W-406, W-395 (All more than 12.5 % TSS Brix)
	NHRDF, Nashik	Acc. No.397, Acc. No.343 (High yielding type) Coll. No.595, Coll. No.606 (High TSS)
Pea	PAU, Ludhiana	C-531, Pb-88
	NBPGR, New Delhi	IC-267587 (187 pods/pl.) JJK-01/46, JJK-01/86, EC-381866, EC-398598 (> 27 % protein content in dry seeds)
Pumpkin	Hyderabad	CM-55, CM-67, CM-35, CM-35, CM-34, CM-64 (High fruit yield) CM-59 (6.5 cm flesh thickness), CM-71, CM-83 (> 6.5 cm flesh thickness)
Cowpea	NBPGR, New Delhi	IC-276938 (Early) IC-219871 (75 pods/pl.) IC-259105, IC-287428 (> 43 cm pod length)
	NBPGR, Jodhpur	EC-18321, EC-57449, EC-390204, IC-259069, IC-259104() All tolerant to <i>Cercospora</i> leaf spot, Powdery mildew, cowpea mosaic virus and charcoal rot
Clusterbean	NBPGR, Jodhpur	IC-40248, IC-40280, IC-40103 (Tolerant to bacterial blight, mosaic virus, leaf spot and charcoal rot)
Tomato	IIVR, Varanasi	CLN-2413R(81.6g/fr wt.), CLN-2413R(4kg/pl.), DR-2(3.162kg/pl.)
	HARP, Ranchi	HAT-142, EC-357841, EC-238508, EC-357834, EC-378836(All high yielder)
	PAU, Ludhiana	CLN-2413R(100g/fr.wt.)
	NBPGR, New Delhi	EC-398702, EC-398715, EC-468370, EC-490119 (All high yielder)
Watermelon	Durgapura	Crimson(Av. fr. wt. 7 kg, TSS 10 %)
Cho cho	ICAR Res. Comp. Barapani	Acc.3 (medium yellow smooth fruit)

Vegetable Agronomy

Weed control

1. Application of Pendimethalin @ 1.5 kg a.i./ha + one hand weeding at 30 DAT gave maximum fruit yield of brinjal cv. JBL-1 (341.66 q/ha) and C:B ratio 1:3.14 at Junagadh. Hence, it is recommended for Junagadh condition.

Biofertilizer

2. At Kalyanpur, the maximum yield (88.38 q/ha) of red ripe chilli cv. Azad Mirch-1 along with C:B ratio (1:2.91) was recorded with the application of 100% recommended dose of NPK (120:60:80 kg/ha) + *Azospirillum* treatment. Hence, it is recommended for Kalyanpur condition.
3. The maximum yield of onion cv. RO-1 (344.9 q/ha) and C:B ratio 1:0.91 were recorded at Durgapura by the application of 100% recommended NPK (100:50:100) + *Azospirillum*. Hence, it is recommended for Durgapura conditions.

Fertilizer trial

4. Application of 240 kg N + 60 kg P₂O₅ and 80 kg K₂O/ha in hybrid tomato Meenakshi at Faizabad gave maximum yield (748.98 q/ha) and C:B ratio 1:3.60. Hence it is recommended for Faizabad conditions. While at Junagadh, the maximum yield (285.26 q/ha) and C:B ratio (1:2.66) were recorded in ARTH-3 with the same treatment. Hence, it is recommended for Junagadh condition.

Liquid fertilizer trial

Tomato

5. At Durgapura, the maximum yield of tomato cv. Pusa hybrid-2 (486.9 q/ha) and C:B ratio (1:1.5) were recorded with 5 foliar sprays of water-soluble fertilizer NPK (15:15:30 @ 0.5%) at 10 days interval over and above to the recommended dose of NPK (120:80:60 kg/ha). Hence, it is recommended for Durgapura condition. However, at Kalyanpur 5 foliar sprays of water-soluble fertilizer (NPK in the ratio of 17:10:27) over and above to the recommended dose of NPK (120:60:80 kg/ha) gave the highest yield (247.7 q/ha) and C:B ratio (1:3.08) with tomato cv. Type-1. Hence it is recommended for Kalyanpur condition.
6. At Hyderabad, 5 foliar sprays (0.5%) of water soluble fertilizer NPK (15:15:30) gave maximum yield (393.8 q/ha) and C:B ratio (1:3.84) in tomato cv. Marutham. Hence, it is recommended for Hyderabad conditions.
7. The maximum yield of tomato hybrid cv. Tolstoi (745.12 q/ha) and C:B ratio (1:4.12) was recorded at IIVR, Varanasi with the 5 foliar sprayings of water-soluble fertilizer NPK (19:09:19 @ 0.5% at 10 days interval after 30 DAT over and above to the recommended dose of NPK (150:80:100 kg/ha). Hence, it is recommended for Varanasi conditions.

Brinjal

8. At Hisar, 3 foliar sprays of water soluble fertilizer NPK (19:19:19 @ 0.5 % at 10 days interval after 30 DAT over and above to the recommended dose of NPK) in brinjal cv. Hisar Shyamal gave maximum yield (259.8 q/ha) and C:B ratio (1:2.89). Hence, it is recommended for Hisar conditions.
9. The highest yield of brinjal cv. Pusa hybrid-6 (329.0 q/ha) along with C:B ratio of 1:3.20 were recorded with 5 foliar sprays of water-soluble fertilizer NPK (17-10-27 @ 0.5 %) at 10 days interval after 30 DAT over and above to the recommended dose of NPK-150:90:90 kg/ha. Hence it is recommended for Pantnagar conditions.

Micronutrients

Tomato

10. At IIVR, Varanasi, maximum yield (827.85 q/ha) and C:B ratio (1:4.81) were recorded with hybrid tomato Tolstoi by 3 foliar application of micronutrients (mixture of B, Zn, Cu, Fe, Mn each @ 100 ppm and Mo @ 50 ppm at 10 days interval 30 DAT over and above to the recommended dose of NPK -150:80:100 kg/ha). Hence it is recommended for Varanasi region.
11. Three foliar sprays of Borax @ 100 ppm over and above to the recommended dose of NPK at 10 days interval 30 DAT at Hisar gave maximum yield (372.8 q/ha) and C:B ratio (1:4.13) in cv. Hisar Arun. Hence it is recommended for Hisar conditions

Capsicum

12. Three foliar sprays of micronutrients (mixture of B, Zn, Cu, Fe @ 100 ppm and MO @ 50 ppm over and above to the recommended dose of NPK at 10 days interval 30 DAT gave maximum yields (226.34 q/ha and 83.13 q/ha and C:B ratio (1:5.05 and 1:3.50) at Faizabad and Kalyanpur. Hence, it is recommended for hybrid Bharat and cv. California Wonder at Faizabad and Kalyanpur conditions, respectively.

Cabbage

13. At Durgapura, 3 foliar sprays of commercial formulation of multiplex @ 100 ppm over and above to the recommended dose of NPK at 10 days interval after 30 DAT gave maximum yield (321.7 q/ha) and C:B ratio (1: 0.62) in cv. Bajrang. Hence it is recommended for Durgapura conditions.
14. At IIVR Varanasi, 3 sprays of micronutrient mixture of B, Zn, Cu, Fe, Mn @ 100 ppm and Mo @ 50 ppm over and above to the recommended dose of NPK (120:60:80 kg/ha) at 10 days interval gave maximum yield (765.98 q/ha) and C:B ratio (1:1.44) in cv. Quisto. Hence, it is recommended for Varanasi condition.

Scheduling of Irrigation

15. Maximum yield (460.98 q/ha) and C:B ratio (1:4.21) were obtained in Narendra Tomato-2 at Faizabad with the application of irrigation at 75 mm CPE level. Hence, it is recommended for Faizabad conditions.

Varietal Trial

Yield data of 1999-2000, 2000-2001 and 2001 and 2002 provided by IIVR was thoroughly scrutinized and the committee identified the following varieties for consideration of the central varietal release committee for release and notification.

Table 2 : Vegetable varieties identified

Crops	Name of Entries	Source	Recommended zones
Chilli	LCA 334	LAM	III, IV, V, VII
Muskmelon	NDM-15	NDUAT, Faizabad	IV
Cowpea	NDCP-13	NDUAT, Faizabad	II, III, IV, VII
Garlic	DARL 52	DARL, Pithoragarh,	I
	G-323	NHRDF, Nasik	VI



LCA-334 (Prashant)



NDM-15 (Narendra Muskmelon-2)



NDCP-13 (Narendra Lobia-2)



DARI-52



G-323 (Yamuna Safed-4)

Physiology, Biochemistry and Processing

Physiology

- Screening of chilli cultivars for drought tolerance was conducted at IIHR, Bangalore. Results indicated that cultivar Krishna and Arka Lohit had better osmotic adjustment during the flowering and fruiting stages. The maximum rate of photosynthesis was observed in cv. Krishna during vegetative and flowering stages. Relative water content was also high in this cultivar. There was good recovery in cv. Krishna, Arka Lohit and Pusa Jwala after release of water stress. These cultivars can be recommended for tolerance to drought after compiling data for three years and the trial may be discontinued.
- Effect of PGR on fruit setting in tomato and chilli was conducted at IIVR and IIHR. At IIHR (Bangalore), spraying of PCPA @ 100 ppm was found effective in improving fruit set of tomato cultivars at high temperature (35°C). Cv. Avinash-2 and CLN-1466A gave good response.
- At IIVR (Varanasi), spraying of PCPA @ 50 ppm under low temperature condition (10-12°C) was found effective in enhancing the tomato fruit set as well as yield by 60 per cent.
- At IIVR (Varanasi) in case of chilli, spray of NAA @ 15 ppm concentration was found effective in enhancing the fruit set and yield during *kharif* season. Further, it was also noted that performance of chilli cv. KA-2 was better than LCA-235.
- In a trial on evaluation of tomato hybrids under saline condition conducted at CCS, HAU, Hissar, it was observed that increasing level of salinity reduced the fruit yield of tomato. Among 10 hybrids tested, ARTH-3 gave the maximum yield of 191.67 g/plant at maximum level of salinity i.e. 10 dSm⁻¹.
- In a trial conducted at CCS, HAU, Hissar on interactive effect of salinity and phosphorus on productivity and physiological behaviour of tomato cv. Hisar Arun, it was observed that application of 80 kg P₂O₅ at salinity level of 4.0 dSm⁻¹ gave the maximum fruit yield of 392 g per plant.

Biochemistry and Processing

- In trials on biochemical composition of vegetables identified by AICRP at PAU, Ludhiana, out of 72

genotypes of tomato fruits tested, Pant T-5 had the highest dry matter content (8.16%). Lycopene was maximum in DVRT-2 and Carotenoids in DARL-61 and VLT-12.

- In case of chilli, 45 hybrids (fruits) were analyzed for ascorbic acid, Dry Matter and Capsaicin content at green stage and for coloring matter and dry matter content at dry red stage. Cv. CH-45 had the maximum ascorbic acid content at green stage. Dry matter at green and red stages was maximum in CH-1 and CH-20, respectively. The colouring matter in red chilli was maximum in CH-35 followed by CH-16.
- In garlic, among the 12 genotypes tested, BT-1-Sel. 3 had the maximum insoluble solids. The pyruvic acid and lachrymatory factor was maximum in G-50.
- In peas out of 9 genotypes tested, sugar content was maximum in PB-37, protein content and phenol content was highest in C-400.
- In muskmelon, out of 11 genotypes tested, TSS was found maximum in NS-7455, while ascorbic acid content was maximum in MS-1 x PB-Sunehri.
- At IIVR, Varanasi, 16 genotypes of tomato were analyzed for quality attributes. Maximum TSS and Total Carotenoid was recorded in H-24. Maximum ascorbic acid content was recorded in DVRT-2. Lycopene content was maximum in Sel. 7.
- In brinjal, out of 15 genotypes tested, total carbohydrate content was maximum in KS-227. Anthocyanin pigment content was maximum in Punjab Barsati. The maximum phenol content was recorded in Pant Samrat.
- In cauliflower, 12 genotypes were tested for quality parameters. Vitamin C was maximum in curds of NS-60. Total crude fibre was maximum in Agahani.
- In cabbage, total 7 cultivars/hybrids were tested. The maximum vitamin C content was recorded in Golden Acre. The maximum fibre and carotene content was recorded in Hybrid-Manisha.
- In a trial on estimation of nitrate and nitrite content of leafy vegetables conducted at IIVR, Varanasi, Palak had maximum nitrate content i.e. 874.23-mg/kg fresh wt. In other leafy vegetables, Lettuce cv. Great lake had the maximum nitrate content.
- In another trial on estimation of oxalate content in tomato and palak, 72 different genotypes of tomato were tested at PAU, Ludhiana. The maximum oxalate content was recorded in tomato cv. P.C. and its minimum value was recorded in Cherry-2.

Insect Pest Management

- The experiment conducted for three years at various locations showed that imidacloprid as seedling root dip (1ml/lit.) in brinjal and need based foliar spray (2 ml/5lit.) in okra is found to be effective against leaf hoppers. However, the house felt that the residue levels at the time of first harvest be determined. It was also suggested by the house to integrate the use of *Leucinodes* pheromone in the IPM of Brinjal Shoot and Fruit Borer.
- For Integrated Pest Management in brinjal under Rahuri condition, the package comprised of: (a) dipping of seedlings in imidacloprid (1 ml/litre) for three hours before transplanting; (b) clipping of infested shoots and removing infested fruits and destroying them; (c) spraying with NSKE 4% starting from flowering at fortnightly interval is recommended.
- On the basis of three years data (2000-02), it is concluded that on initiation of egg laying by *Helicoverpa armigera*, 5 weekly releases of egg parasitoid, *Trichogramma pretiosum* @ 50,000/ha coupled with 3 sprays of HaNPV @ 1.5×10^{12} POBs/ha at 10 days interval and 3 fortnightly sprays of endosulfan 35 EC @ 700 g a.i./ha gave best control of tomato fruit borer and resulted in the highest economic returns at Ludhiana.

- Work carried out at IIHR, Bangalore for three years indicated high level of resistance to cypermethrin in DBM. But appreciable resistance has not been observed to Bt and NSKE 4% and the level of resistance has not significantly increased over years. Thus, Bt and NSKE 4% are still very efficient in the management of DBM.

Hybrid Trials

The committee discussed the total report and has recommended the following hybrids for release after thoroughly scrutinizing the data of minimum two years.

Table 3: List of identified hybrids

	Crops	Name of hybrids	Source	Recommended zones
1.	Tomato (ind)	KTH-2	CSAUT	IV, V
2.	Brinjal (round)	BH-2	PAU	IV, V
		VRBHR-1	IIVR	IV, VI
3	Chilli	ARCH-228	Ankur Seed	IV, V, VI
4	Capsicum	DARL-202	DARL	I, IV
5.	Bitter gourd	Pusa Hybrid-2	IARI	IV, V, VI
6.	Cauliflower	DCH-541	IARI	II, IV



KTH-2



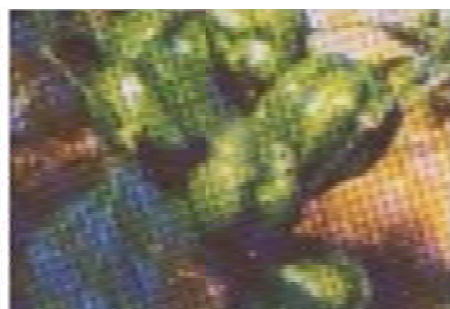
BH-2



VRBHR-1 (Kashi Sandesh)



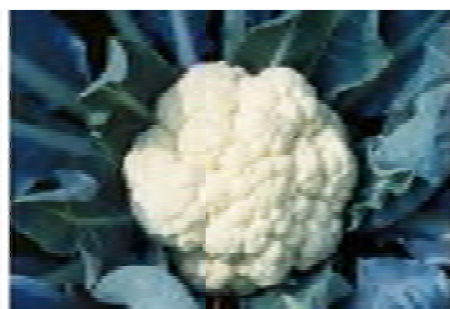
ARCH-228



DARL-202



Pusa Hybrid-2



DCH-541 (Pusa Kartik Shankar)

Disease Management

Following recommendations were finalized and accepted in the group meeting.

1. Seasonal occurrence of brinjal diseases

Alternaria and *Cercospora* leaf spot is most important disease of brinjal with maximum incidence 22.0 and 17.9% respectively during first fortnight of November in Coimbatore regions.

2. Seasonal occurrence of chilli diseases

Alternaria leaf spot, *Phytophthora* leaf blight, *Cercospora* leaf spot, die-back, fruit rot, bacterial wilt and mosaic are the main diseases in Vellanikkara. Of these *Alternaria* leaf spot showed maximum severity that was recorded maximum codex value of 56.0 in September when temperature ranges 23.2 to 30.6°C, RH 82-94% and high rainfall (30 cm).

3. Integrated management of disease complex of chilli

Seed treatment with thiram @ 0.2% along with soil application of carbofuran @ 1.25 kg ai/ha and one spray of Monocrotophos @ 0.05% along with mancozeb @ 0.3% at 30th day after sowing in nursery beds followed by four sprays of Carbendazim @ 0.1% at 15 days interval is best treatment with maximum (1:3.1) C:B ratio under Coimbatore conditions.

4. Integrated management of insect borne viruses in chilli

Soil nursery covering with nylon net 60-100 mesh, soil application of carbofuran @ 1 kg ai/ha, seedling dip in imidacloprid @ 0.2% for 3 hours followed by soil application of carbofuran @ 1.5 kg ai/ha one week of transplanting + three spray of imidacloprid @ 0.1% at 10 days interval after 30 days of transplanting is recommended with maximum C:B ratio (1:11.7) from Rahuri.

5. Management of bacterial diseases of cauliflower with biocontrol agents

Seed treatment with *Pseudomonas fluorescens* @ 10 g/kg seed followed by seedling dip in 0.2% *Pseudomonas fluorescens* suspension for 30 minutes and three sprays of *Pseudomonas fluorescens* @ 0.2% at 10 days interval is best with highest 1:33.2 C:B ratio under Sabour conditions.

6. Survey and identification of different diseases of pointed gourd

Phytophthora blight caused by *Phytophthora cinnamomi* was most destructive disease with 40% incidence in September *Didymella bryoniae*, *Pseudoperonospora cubensis* and nematode disease *Meloidogyne incognita* were recorded for minor incidence in Varanasi region.

7. Management of powdery mildew of okra by neem product and chemicals

Four sprays of triforine @ 0.15% at 10 days interval is best with maximum cost benefit ratio (1:11.0) from Rahuri centre.

Seed Production

- At Jabalpur centre, the pooled data of three years revealed that maximum seed yield of 9.35 q/ha in onion cv. (AFLR) was recorded under treatment T₄ (paired row planting with fertilizer mixture application before planting in individual holes).

- Maximum seed yield in okra cv. Utkal Gaurav can be obtained with 15th May sowing at 45x45 cm distance under Bhubaneswar conditions.
- Under Jabalpur conditions, the seed production of okra cv. Parbhani Kranti can be profitably taken up at 60x45 cm spacing with sowing date of March II week.
- Maximum seed yield (15.75 q/ha) can be obtained with 160 kg/ha Nitrogen in french bean cv. Arka Komal under Ranchi conditions.
- It is recommended that the seeds should be extracted from first picking in tomato for maximum test weight, germination (%) and vigour under Bhubaneswar conditions.
- It is recommended that the seeds should be extracted by fermentation in water for 48 hours in brinjal for maximum test weight, germination (%) and vigour under Bhubaneswar conditions.
- In brinjal cv. JB-64, maximum marketable seed yield of 6.5 q/ha obtained with acid fermentation @ 10 ml/kg pulp for 30 minutes is recommended under Kymore plateau and Satpura hills conditions of Madhya Pradesh with a C:B ratio of 1:7.41.
- For enhanced seed production of bell pepper cv. California Wonder, spray of Borax @ 0.5% at vegetative, flowering and fruit setting stage is recommended with a C: B ratio of 1:1.01 under Solan conditions.
- For enhancing storage life of bell pepper seed, treating of seed with CaCl₂ @ 10⁻⁴ M solution was found best with respect to seed quality characters at Solan.

Resistant Varietal Trial

After thorough analysis of the data for the last five years, the following entries were identified as resistant and recommended for release under AICRP (VC) Programme during XXI Group meeting held at GAU, Anand.

Table 4: List of resistant varieties identified

Crops	Name of the entries	Centre	Disease	Recommended zones
Peas (Mid season)	DPP-9411	HPKV	Powdery Mildew	I
Okra	VRO-6	IIVR	YVMV	IV &V
Okra	VRO-5	IIVR	YVMV	VI



DPP-9411



VRO-6 (Kashi Pragati)



VRO-5 (Kashi Vibhuti)