

XXIII-Workshop

Venue : BCKVV, Kalyani

Date : 16th - 19th April, 2005

Collection, Evaluation and Conservation of Germplasm

Table 1: List of promising germplasm available with different centres 2003-04

Crops	Source	Notable / Promising Germplasm
Pointed gourd	IIVR	PG1, PG-2, (Higher yield soft and less seed)
	Sabour	3 new germplasm added
	Ranchi	Swarna Rekha and HARP-81
Watermelon	Durgapura	122 (GP-16, TSS 15%; GP-42, 17%)
Onion	IIHR	Bellary Onion, 15.5t/ha; Rampur Local, 14.90 T/ha; Rose Onion-2, 18.6 % TSS; Rose Onion-4, 18.53% TSS
	NRCO&G	Red: NRCOG-131 (24 t/ha; 11.44% DM) NRCOG-870, 881 (23.9 t/ha) White: W-098 (24 t/ha)
	NHRDF (Nasik)	Coll No. 681 (15 %TSS), Coll. N- 372, 400 (14.0 % TSS), Cool. 474 (45.2 t/ha), Coll. 628 (40.4 t/ha)
Garlic	NRCO&G	ACC No. 229 (7.1 t/ha), ACC-201 (7 t/ha), IC-375092 (4.5 t/ha)
	NHRDF (Karnal)	No. 367 (10.74 t/ha), No. 368 (9.8 t/ha)

Table 2: List of promising germplasm available with different centres 2004-05

Crops	Source	Notable / Promising Germplasm
Amaranths	Jorhat	JAC-5 (1.13) & JAC-4 (0.76) kg/ plant
	IIHR	IIHR-49 (100 g) IIHR-52 (85 g)
Bitter gourd	IIVR	VR-231 (1.9 kg/ plant), VR-235 (fruit length 20.38 cm), VR-234 (1.8 kg/ plant),
	Jabalpur	JMC-26 (750 g/plant), JMC-27 (690 g/plant)
Bottle gourd	IIVR	VR-177, VR-178 (cylindrical 40 cm long),
	Rahuri	RHRBG-4 (early flowering), RHRBG-10, RHRBG-33, RHRBG-12 (25 cm, small fruited)
	Faizabad	NDBG-601, NDBG-619, NDBG 509-3-2, (high yield)
Cucumber	Solan	UHF-Sel. (310) and LC-1 (310) q/ ha.
Pointed gourd	IIVR	VR-241 (142.3 q/ha), VR-240 (136.8 q/ha), VR-238 (13.8 q/ha), VR-237 (6.8 cm long)
	Faizabad	NP-801, NP-802, NP-803, NP-804, NP-805
	Sabour	Rajendra P-1 (159.0 q/ha), Rajendra P-2 (142.0),
	Ranchi	Swarna Rekha, HAP-1, HAP-37, HAP-102, HAP-106
Ivy gourd	Vellanikkara	CG-23 (10.05 kg/ plant), CG-85 (8.2 kg /plant)
	IIVR	VR-19 (10.40 kg/plant), VR-18 (9.3 kg/ plant)
	Raipur	Indira Kundru-05 (22 kg/ plant), Indira Kundru-35 (21 kg/ plant)
Pumpkin	Faizabad	NDPK-401-2 (late maturing), NDPK-2409 (very early)
	Hyderabad	CM-35(16.8), CM-71 (16.2), CM-115 (15.9), CM-25 (15.5) kg/vine
Cho-Cho	ICAR Res. Complex Barapani	Meghalaya-14, Meghalaya-15 (Less spiny), Meghalaya-1 (Green and less spiny), Sikkim-4, Sikkim-16 (413 g)

FOUR DECADES... ACCOMPLISHMENT OF AICRP ON VEGETABLE CROPS

Crops	Source	Notable / Promising Germplasm
Tomato	IIVR	EC-538408, EC-538411, EC-538441, EC-538416,
	Solan	Ovegen-II, Santian, Siletz, Oregon Pride for high yield (450 q/ha),
	Ludhiana	CLN2123A, CLN2116B, CLN212E, CL5915-206 resistance for TLCV
	NBPGR	Higher Fruit no. /plant :EC 318193, EC 251613, EC 251566, Fruit weight: EC 141887
Brinjal	IARI	480-1 (1.8 kg/plant), 498-8, 509-4, 540-8, 550-4-2,
	Raipur	CGB-10, CGB-18, CGB-24, CGB-28
	NBPGR	IC 332506, IC 383190
	Ranchi	VKG-21/228 (744.67 q/ha), IC-144060 (739.25 q/ha)
Chillies	IIVR	BS-35 (Resistant to Paper leaf curl virus)
	Dharwad	KCS-2013, Ajeet-6, KA-2 for higher yield (10.2 t/ha), BC-25, LCA-353 (13.6 t/ha green chillies)
	Srinagar	SH-KC-12, SH-KC-9 (343.3 g/plant)
	Lam	LK 100 (564.0 g/pl), PBC-3 (5 fruit / plant)
	Jorhat	C-5, C-6, C-7 higher fruits / plant)
	IIHR	MC-111, INGR 04052, 04053, 04054 registered with NBPGR
Capsicum	Srinagar	SH-SP-1007 (813.3 g/pl.), 81.3 fruit/plant.
Paprika	Dharwad	Dry Fruit yield / plant – SKAU-P-201, Arka Abhir
	Srinagar	Fruit red ripe per plant : SH-P-1005 (844 g/pl), SH-P-1006 (419.6 g/pl.)
Pea	IIVR	EC-414485 (31.33 pods/plant), EC-414483 (28 pods/plant)
French bean	Dharwad	DWD-FEB-6 (124.4 g/pl.)
	Pantnagar	From CIAT, Columbia promising PCPGR-2868, 2870, 2873
Lablab bean	IIVR	VRD-149(213 pods/plant), D-141 B (144 pods / plant)
	Dharwad	DB-11-1, DB-25-1, DB-1 for yield/ha
Okra	IIVR	No. 136 (thin & long pod) , SC-25, No.120 and 122 for yield, No. 315 – Bushy type, SC-125 – Immune to YVMV
	Bhubaneswar	Ac.18, 37, 46, 52, 56, 58, 60, 62 (tolerant to YVMV)
Carrot	Hisar	Red: HC-100, HC-27, BC-3, Desi Red Karnal (26.6 cm root length), HC-4-2 (20.6 cm root length), HCP-226-1 (25 cm root length), Purple: HCP-227-1 (21 cm root length), Orange : HCO-4 (22.0 cm root length) and HCO-1 (20 cm root length), Black : HCB-22-1, HC2B & HCB-4-2 (17.0 cm root length), Yellow : HCY-183 (20 cm root length), HCY-235 (18.0 cm)
	Temperate	
	Katrain	8 cms line being maintained
	Srinagar	SH-C-18 (323.3 q/ha), SHC-5-1 (298.3 q/ha)
Onion	IIHR	White onion TSS (13.15%)
Garlic	NHRDF, Karnal	G-60, G-282, G-346, G-351, G-378
Cauliflower	IIVR	Kunwari : Kuwari-23/39 (550 g curd wt.), Katakai : Katakai early 23/40 (700 g curd wt.), Katakai early 23/95 (550 g curd wt.)
	Sabour	2002-1 (425 g curd wt.), 95-3 (410 g curd wt.)

Crops	Source	Notable / Promising Germplasm
Mid		
	IIVR	Agahani : Agahani Awasthi Seed (950 g curd wt.) Agahani Prem Seed (900 g curd wt.), Agahani, Pusi : Prayas Seed (840 g curd wt.),, Aghani 23/74 (800 g curd wt.) Pusi Prem Seed (1700 g curd wt.), Pusi Chandradev (1600 g curd wt.) Maghi : Maghi SS (2100 g), SF Maghi (2800 g curd wt.)
	Sabour	98-3 M White (530 g curd wt.), 97-1 M Creamy white (520 g curd wt.)
Late		
	Solan	Every Day (641 g curd wt.), Pacific charm (483.33 g), Perfection improved (minimum curd wt. 408.88 g)
Cabbage	Katrain	Previous; EC-490162, 490165, 490174, 490176, 490191 & EC-490200 4 S line, 5 cms lines are being maintained
	Solan	Pride of Asia (850 g), Autumn Victory (Max. Curd Weight 900 g)

Vegetable Agronomy

Integrated Nutrient Management

- At IIVR, Varanasi application of Pressmud @ 5 t/ha + rest NPK through chemical fertilizers gave maximum yield of brinjal cv. IVBL-9 (106.7 t/ha) and C:B ratio (1:4.09) and also maximum yield of okra cv. VRO-6 (12.5 t/ha) and C:B ratio (1:2.76) in brinjal-okra cropping pattern trial. Hence it is recommended for Varanasi conditions of U.P.
- At Jorhat, application of FYM @ 10 t/ha + rest NPK through fertilizers resulted in higher yield of brinjal (244.5 q/ha) as well as okra (131.5 q/ha) along with maximum C:B ratio (1:3.35) for the whole cropping system. Hence, it is recommended for Jorhat conditions.
- At IIVR, Varanasi the maximum yield of Garden Pea cv. Azad P-3 (80.7 q/ha) along with maximum C:B ratio 1:1.32 was recorded with application of FYM @ 10 t/ha + half recommended NPK . Hence, it is recommended for Varanasi conditions.

Use of micronutrients

- The maximum mean head yield of 557 q/ha and C:B ratio (1:5.93) were obtained with three foliar sprays of micronutrient mixture (B, Zn, Cu, Fe, Mn, each @ 100 ppm and Mo @ 50 ppm) at 10 days interval starting from 40 days after transplanting in the cabbage cv. Golden Acre at Srinagar. Hence, it is recommended for Srinagar conditions.

Use of biofertilizers

At IIVR, Varanasi, application of Azospirillum + 75% N and full P and K in cauliflower cv Snowball-16 gave maximum yield (260.7 q/ha) along with C:B ratio (1:2.54). Hence, it is recommended for Varanasi conditions.

- At Srinagar, maximum yield (229 q/ha) of capsicum cv. Nishat-1 with C:B ratio of 1:2.31 was obtained with three sprays of water soluble fertilizers having the combinations of NPK 17:10:27. Hence, it is



Use of bio-fertilizers in Capsicum

recommended for Srinagar conditions. At IIVR, Varanasi the maximum yield of capsicum cv. Indra (82.10 q/ha) and C:B ratio 1:4.08 were obtained with 5 foliar sprays of water soluble liquid fertilizer having a combination of NPK – 19:09:19 at 10 days interval after 40 DAP. Hence, it is recommended for Varanasi conditions.

- At IIVR, Varanasi 5 foliar sprays of water soluble fertilizers having a combination of NPK-19:19:19 at 10 days interval after 40 DAP, resulted in maximum yield (342 q/ha) in cauliflower cv. Snowball-16. Hence, it is recommended for Varanasi conditions.
- At Vellanikkara, 5 foliar applications of Multi-K at 10 days interval beginning 30 DAP resulted maximum yield (496 q/ha) and C:B ratio (1:1.6) in brinjal hybrid Neelima. Hence, it is recommended for Vellanikkara conditions.
- In okra cv. Aruna, maximum yield (161.4 q/ha) and C:B ratio (1:1.3) were obtained with 3 foliar sprays of water soluble fertilizer having the NPK formulation of 19:19:19 at Vellanikkara. Hence, it is recommended for Vellanikkara conditions.
- At Hyderabad, maximum yield (78.3 q/ha) and C:B ratio (1:1.68) were obtained in okra cv. Arka Anamika with 5 foliar sprays of water soluble fertilizers having NPK formulation – 15:15:30. Hence, it is recommended for Hyderabad conditions.
- At Coimbatore, maximum yield (202 q/ha) and C:B ratio (1:3.82) were obtained with 5 foliar sprays of water soluble fertilizers having NPK formulation – 19:19:19 in okra hybrid Mahyco No.10. Hence, it is recommended for Coimbatore conditions.

Standardization of planting date and spacing

- At Pantnagar the maximum yield (170 q/ha) and C:B ratio (1:3.04) were obtained in broccoli hybrid Fiesta when planting was done on 15th October at 45 x 30 cm spacing. Hence, it is recommended for Tarai conditions of Pantnagar.
- At IIVR, Varanasi planting of broccoli cv. Fiesta at 45 x 30 cm spacing on 15th October resulted in maximum yield (297.0 q/ha) and C:B ratio (1:4.25). Hence, it is recommended for Varanasi conditions.
- At Srinagar, the maximum yield (186.7 q/ha) and C:B ratio (1:2.57) were obtained in broccoli hybrid Green Head with the planting on 30th August at 45 x 30 cm spacing. Hence, it is recommended for Srinagar conditions.

Varietal Trial

Yield data for the year 2002-03, 2003-04 and 2004-05 provided by IIVR was thoroughly scrutinized by the committee and the following 14 varieties of 10 crops were identified for consideration to CVSC.

Table 3: List of varieties identified for release

Crops	Name of Entries	Source	Recommended zone
Brinjal (round)	HABR-4	HARP, Ranchi	IV (Jharkhand, Bihar)
	IVBR-1	IIVR, Varanasi	IV (Uttar Pradesh, Punjab)
Tomato (det.)	IIVR Sel. - 1	IIVR, Varanasi	V (Chhatisgarh) VII (Maharashtra)

Crops	Name of Entries	Source	Recommended zones
Tomato (indet.)	IIVR Sel. - 2	IIVR, Varanasi	I (Himachal Pradesh, Jammu & Kashmir)
	BT-136	OUA&T, Bhubaneswar	II (West Bengal) IV (Jharkhand)
	VLT-32	VPKAS, Almora	IV (Uttar Pradesh)
Chilli	KA-2	IIVR, Varanasi	IV (Uttar Pradesh, Punjab)
Cauliflower (early)	IVREC-2	IIVR, Varanasi	IV (Uttar Pradesh)
Pea (early)	VRP-5	IIVR, Varanasi	I (Himachal Pradesh, Uttaranchal)
			IV (Uttar Pradesh)
			VIII (Karnataka)
Pea (mid)	CHP-2	HARP, Ranchi	IV (Jharkhand, Bihar)
			VI (Rajasthan)
Cowpea	CHCP-2	HARP, Ranchi	VIII (Kerala, Karnataka)
French bean	IVFB-1	IIVR, Varanasi	I (Himachal Pradesh)
			VII (Madhya Pradesh)
Sponge gourd	CHSG-1	HARP, Ranchi	IV (Uttar Pradesh, Bihar, Jharkhand)
	JSGL-55	GAU, Junagarh	VII (Maharashtra)



HABR-4 (Swarna Shobha)



IVBR-1 (Kashi Prakash)



IIVR Sel-1 (Kashi Hemant)



IIVR Sel-2 (Kashi Sharad)



BT-136



VLT-32



KA-2 (Kashi Anmol)



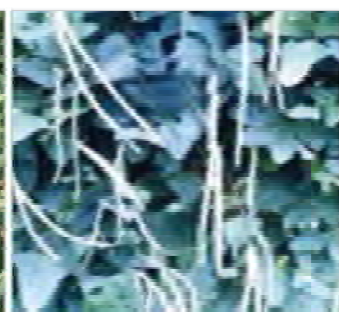
IVREC-2 (Kashi Kunwari)



VRP-5 (Kashi Nandini)



CHP-2 (Swarna Mukti)



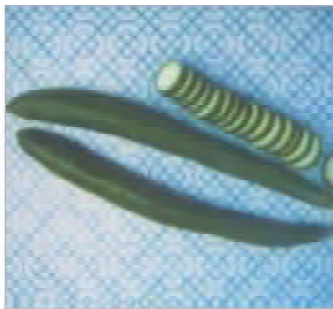
CHCP-2 (Swarna Suphala)



IVFB-1 (Kashi Param)



CHSG-1 (Swarna Prabha)



JSGL-55

Physiology, Biochemistry and Processing

Physiology

- At IIVR Varanasi, the effect of PGR on fruit setting in chilli was recorded on two chilli varieties viz., LCA-235 and KA-2. Significantly higher yield was realized with the application of 15 ppm NAA at the flowering stage. Numerically yield of LCA-235 was higher as compared to KA-2, but statistically both were at par.
- Experiment conducted at IIHR, Bangalore on morpho-physiological response of capsicum in relation to different seasons. Photosynthetic rate was higher in Arka Gaurav during the fruiting stage. Highest harvest index was observed in Indra (46%) followed by Arka Gaurav (45%). During the kharif season, total biomass was maximum in Arka Gaurav during the flowering stage and in Indra during the fruiting stage. Higher photosynthetic rate was observed in Indra at both flowering and fruiting stages. Harvest index was maximum in Indra (58%).

Biochemistry

- At PAU, Ludhiana, among 61 genotypes of tomato, dry matter varied from 3.54 to 8.46%, TSS from 3.6-6.2° brix and pH from 3.01-4.83 respectively. Ascorbic acid was maximum in VLT-34 (63.70 mg/100 ml juice), whereas, lycopene was highest in RMACVP-1-1 (5.63 mg/100g). The range for carotenoids was 1.25-8.90 mg/100g being maximum in hyb-1089 followed by Biowonder and NDTS-2002-2.
- In capsicum, 18 genotypes were evaluated. The dry matter ranged from 4.80-8.36%, chlorophyll in the range 0.04-0.23 mg/g and capsaicin in the range 0.12-0.32%. Ascorbic acid was highest in Mahabharat (164.22 mg %) followed by Biotara (157.08mg %).
- Six genotypes of muskmelon were analyzed and TSS was found highest (11.1%) in Pb. Hybrid. Pb. Hybrid also had the highest ascorbic acid (58.75 mg/100 ml). Dry matter ranged from 7.39-10.34% and pH from 5.73-6.73 respectively.
- Six lines of cucumber were tested and dry matter ranged from 1.37-3.81%, while ascorbic acid was highest in Pusa Sanyog (56.34 mg/100g).
- Six lines of peas were analyzed, C-531 had the highest protein content as well as high phenolics.
- Seventy six lines of brinjal were estimated for dry matter, phenols and sugars which ranged from 4.05-11.51%, 79-216 mg/100g and 2.17-24.07% respectively.
- At IIVR, Varanasi twenty two tomato accessions were analyzed. The pH varied from 4.0 – 4.5. TSS ranged from 3.0 – 5.8 ° brix. The acidity of tomato ranged between 0.256 to 0.704 %. Ascorbic acid

varied from 17.06 to 44.39 mg/100g. The total carotenoids ranged from 0.997 to 9.903 mg/100g. The lycopene content varied between 0.196 to 7.149 mg/100g.

- Eighteen varieties of brinjal were evaluated. The ascorbic acid content ranged from 4.95 to 6.60 mg/100g fresh weight. Total carotenoids ranged from 0.093 to 1.426 mg/100g.
- Twenty five promising lines of muskmelon were analyzed. The ascorbic acid and total carotenoids contents ranged between 1.82 to 4.55 mg/100g and 2.015 to 7.150 mg/100g respectively.
- The second experiment on estimation of nitrate and nitrite content in leafy vegetables was conducted at IIVR, Varanasi. The nitrate content ranged from 377.24 to 984.17 mg kg⁻¹ fresh weight. Maximum nitrate content was recorded in Lettuce (984.17 mg kg⁻¹ fresh weight). The nitrite content ranged from 0.43 to 1.15 mg/kg fresh weight.
- At PAU, Ludhiana, analyses of sixty-one genotypes of tomato showed oxalate in the range 4.98-13.07 mg/100g. Some low oxalate and high oxalate lines were identified.
- At PAU, Ludhiana Chilli was analyzed at green as well as red stage. In green chilli, the ranges for dry matter, ascorbic acid and capsaicin were 8.89-19.32%, 89.98-171.25 mg/100g and 0.07-0.31% respectively. S-39-1 had the highest dry matter and 039-3-2 had the highest capsaicin. At red stage, Ravindra had the highest dry matter (37.03%) while coloring matter was highest in PH -10 (265.32 ASTA units). Capsaicin ranged from 0.31-0.83%, being maximum in CH-1. Some high colour and high capsaicin genotypes were identified.
- At IIVR, Varanasi, twenty promising lines of chilli were analyzed at red ripe stage for their quality characters. The dry matter ranged from 18.82-50.25%. The ascorbic acid content ranged from 20-340 mg/100g. On dry weight basis the capsaicin and oleoresin ranged from 0.18 to 0.7% and 7.2 to 16.8% respectively. The maximum capsaicin content was recorded in genotype DC-16 (0.7%), whereas, the minimum capsaicin content was recorded in genotype PBC-535 (0.18%), KA-2 and DC-4 had maximum oleoresin content (16.8%).

Disease Management

Integrated management of bud necrosis of watermelon

Seed treatment with Imidacloprid @ 5 g/kg seed + one foliar spray of Imidacloprid @ 0.075% after 30 days of emergence recorded least watermelon bud necrosis incidence (19.4%) with maximum yield of 162.4 q/ha as compared to 55.4% mean disease incidence and 88.7 q/ha yield in control at Hyderabad region. Four sprays of Acephate @ 1.5 g/l at 10 days interval is recommended in Hessarghatta conditions. However, soil application of carbofuran @ 1.25 kg a.i./ha is recommended in Durgapura conditions.

Integrated management of pointed gourd disease complex

Raised bed cultivation of pointed gourd along with four sprays of copper fungicide @ 0.5% starting from 2nd week of May at 15 days intervals showed most effective in reducing *Phytophthora* vine rot (4.96%) and fruit rot incidence (5.03%) with maximum yield of 172.9 q/ha and C:B ratio 1:3.7 at Sabour conditions.

Studies on associated seed mycoflora of tomato, chilli, brinjal and its management

Tomato seed mycoflora are *Aspergillus* sp., *Penicillium* spp., *Alternaria* spp., *Rhizopus* spp., *Fusarium* spp. Brinjal seeds were associated with *Aspergillus fumigatus*, *Alternaria alternata*, *Fusarium* spp., *Curvularia* spp. *Rhizopus* spp. and *Penicillium* spp. while chilli seeds with *Colletotrichum capsici*, *Fusarium* spp., *Alternaria*

spp., *Penicillium* spp. The seed treatment with Carbendazim @ 0.2 % was found most effective in tomato and chilli, while Captan @ 0.2% in brinjal. This was at par with *Trichoderma* @ 4 g/kg seed in the management of seed borne fungi at Rahuri conditions.

Colletotrichum gloeosporioides, *Cladosporium* sp., *Rhizoctonia solani*, *Alternaria solani*, *Curvularia lunata*, *Fusarium solani*, *Rhizopus* sp. and *Aspergillus* sp. in chilli were associated seed mycoflora. Carbendazim and captan @ 0.2% as seed treatment were found effective at Hessarghatta as well as Solan conditions. Seed treatment with *Trichoderma* formulations *Trichoderma* @ 4g/kg reduced pathogenic seed fungi and seen inferior to fungicide.

Aspergillus flavus, *Curvularia lunata*, *Fusarium semitectum*, *Phomopsis vexans* and *Alternaria alternata* associated with brinjal seeds while *Aspergillus flavus*, *A. niger*, *Cercospora* sp., *Fusarium equisetii* and *Colletotrichum capsici* with chilli seeds. Tomato seeds were infected by *Aspergillus niger*, *Rhizopus nigricans* and *Verticillium alboatrum* in Sabour conditions.

Highest germination percentage was recorded in chilli (86.72%), tomato (74.60%) and brinjal (77.72%) and lowest seedling infection in chilli (12.36%), tomato (18.65%) and brinjal (18.23) by seed treatment with captan (0.2%) at Lam conditions.

For increasing germination and reducing seed colonization, seed treatment with captan @ 0.25% was most effective in Sabour conditions while Carbendazim @ 0.2% at Coimbatore conditions.

Disease management of vegetable crops at nursery stage with biocontrol agent and plant products

1. Seed treatment with captan @ 0.25% and soil drenching by 0.25% solution @ 6 lit/m² of nursery bed was best for tomato. Seed treatment with *T. harzianum* @ 4 g/kg followed by soil application of *T. harzianum* (10 g multiplied in 1 kg FYM /m²) was statistically at par at Hessarghatta conditions.
2. Seed treatment @ 15 g/kg seeds and soil application of *Azotobacter chroococcum* @ 10 g/kg FYM/m² was best for the management of damping off caused by *Pythium aphanidermatum* in tomato and brinjal at Ranchi conditions.

Insect Pest Management

1. Five sprays of pulverized neem seed powder extract (4%) and pongamia soap (1%) at 10 days interval from 20 DAT was found to be effective against diamondback moth in cabbage with a C:B ratio of 14.44 and 8.33 respectively under Hessarghatta conditions.
2. Alternate sprays of lambda-cyhalothrin @ 15 g a.i./ha and profenophos @ 800 g a.i./ha at 35, 50, 65 and 80 DAS had highest net returns of Rs.11350/- with cost benefit ratio of 1:4.93 and is suggested for the management of okra pests under Sabour conditions.
3. Five sprays of profenophos 50 EC (0.1%) at 20, 35, 50, 65 and 80 days after transplanting gave good control of brinjal shoot and fruit borer with C:B ratio of 1:4.39 under Ludhiana conditions.
4. For the management of leafhopper, whitefly and fruit borer of okra, soil application of neem cake @ 250 kg/ha at 20 days after sowing followed by three sprays of NSKE (4%) at an interval of 15 days from 45 days after sowing are recommended under Rahuri conditions.

Heterosis Breeding

The committee thoroughly reviewed the available data of AVT trials and based on the consistent better performance, identified the following hybrids for recommendations to the CVRC for their consideration for release. Concern centres are requested to send 70 copies of release proposal to Director IIVR within a month of the publication of this proceeding.

Table 4: List of Hybrids identified

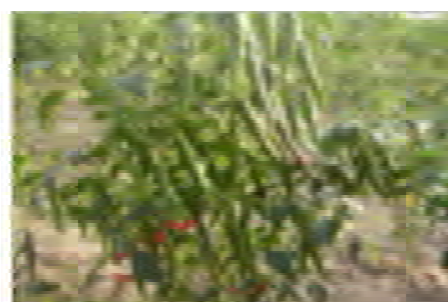
Sl.No.	Crops	Hybrids	Source	Recommended zones
1	Tomato	TH 01462	Syngenta	I,II,IV,VI,&VII
2	Brinjal	VNR-51	VNR Seeds	IV&VI
3	Chilli	CCH-2	IIVR	II, IV, V & VI
4	Capsicum	KTCPH-3	Katrain	I, VI&VII
5	Cauliflower	SYCFH-203	Syngenta	IV, V & VII
6	Cabbage	KGMR-1	Katrain	I&IV
7	Okra	HBH-142	Hisar	IV, V & VII
		SOH-152	Syngenta	IV&VII
8	Cucumber	PCUCH-3	Pantnagar	I&IV



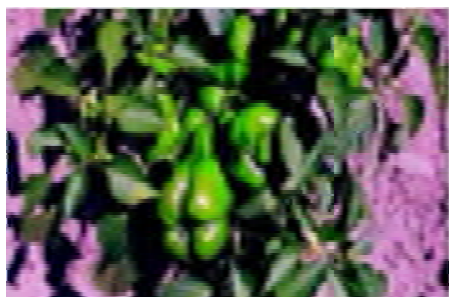
TH-01462 (All Rounder)



VNR-51 (Khushi)



CCH-2 (Kashi Surkhi)



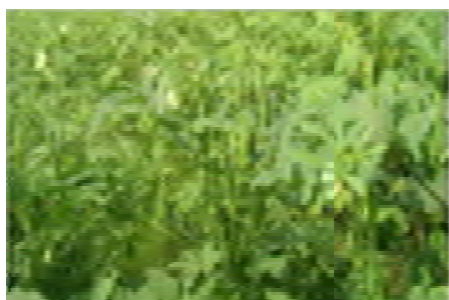
KTCPH 3



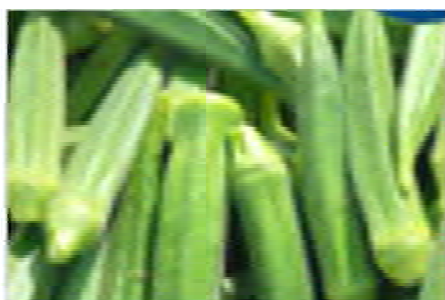
SYCFH-203



KGMR-1



IIBII-142



SOH-152



PCUCH-3

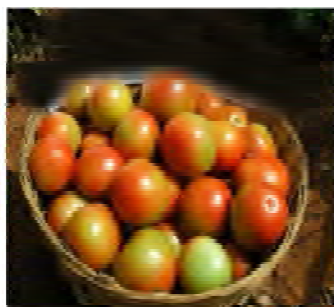
The committee also reviews the performance of hybrids of tomato, brinjal and chilli developed under the NATP project and based on the data on yield and premium attributes the committee recommended following hybrids for recommendation to CVRC for their consideration for release.

Table 5: List of Hybrid cultivars

Crops	Hybrids	Premium attribute(s)	Developing centers	Recommended Zones
Tomato	NTH-6	High yield	IIVR	IV, VI
	TLBRH-9	Combined resistant to bacterial wilt and TLCV	IIHR	All Zones
	HATH-3	Resistant to bacterial wilt and early blight	HARP	IV
	BCTH-4	Resistant to TLCV	BCKV	II, V
Brinjal	BWBH-3	Bacterial wilt resistant	IIHR	All Zones
	COBH-3	Bacterial wilt resistant	TNAU	VIII
	HABH-3	Bacterial wilt and phomopsis resistant	HARP	IV
	BCBH-17	High yield	BCKV	II, V
Chilli	CCH-3	Dual purpose	IIVR	IV, V, VIII
	MSH-149	CMS based	IIHR	All Zones
	MSH-172	CMS based	IIHR	All Zones
	KCH-3	Pickle type fruit	CSAUAT	IV
Cabbage	KGMR-1	High yielding	Katrain	I & IV



NTH-6



TLBRH-9 (Arka Ananya)



HATH-3 (Swarna Sampada)



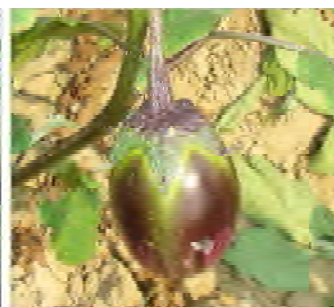
BCTH-4 (Bidhan Tomato Hyb.-4)



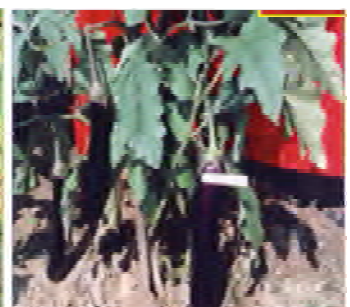
BWBH-3 (Arka Anand)



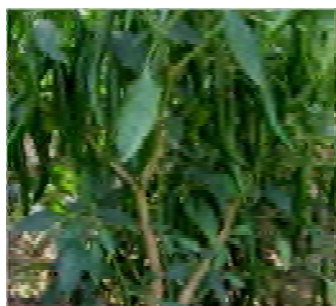
COBH-3



(HABH-3) Swarna Ajay



BCBH-17



CCH-3 (Kashi Early)



MSH-149



MSH-172 (Arka Meghana)



KCH-3

Seed Production

- Based on two years' study at Solan on Carrot using pollinators *Apis mellifera* and *Apis cerana*, it is recommended that to obtain max yield/ha, open pollination in isolation should be adopted and not the induced pollination.
- Planting of paprika (KTPL-19) at a spacing of 60 x 30 cm and application of 200 kg N/ha has been recommended to obtain highest seed yield of 366 kg/ha under Srinagar conditions based on two years study.
- On the basis of three years data it is recommended that maximum yield (13.96 q/ha) of good quality seed in onion can be obtained by paired row planting on ridges under Rahuri conditions.
- On the basis of three years data it is recommended that maximum yield of good quality seed in chilli var. Phule Jyoti can be obtained with the application of Planofix spray @ 2.5 ml/gallon of water + DAP 1% + MoP 0.50% under Rahuri conditions.
- Foliar application of mixture of all micronutrients (i.e. Zinc sulphate, Manganese sulphate, Copper sulphate, Ferrous sulphate, Ammonium molybdate & Borax) at ten days interval starting from forty days after transplanting is recommended based on three years data to obtain highest seed yield of 258 kg/ha in Capsicum var. Nishat-1 under Srinagar conditions only.
- Based on three years data at Junagadh, sowing of okra var. Varsha Uphar on 15th June is recommended for south Saurashtra region for obtaining maximum yield (12.5 q/ha) of good quality seeds and in the same variety, 15th June in Kharif & 28th February in summer are recommended by NHRDF, RRS, Karnal based on three years study whereas sowing on 10th June is recommended by Ludhiana based on four years data to obtain maximum yield (12.8 q/ha) of good quality seeds.
- Priming with PEG (-1.0 Mpa) in pea (Arkel) seeds at Jabalpur and with Na₂HPO₄ (0.001M) in bitter gourd (Priya) seeds at Vellanikkara produced maximum germinability and vigour during three year trial.
- Based on three years data at Vellanikkara, it is recommended that bitter gourd seeds should be harvested at 21 days after anthesis to obtain maximum recovery, germination and vigour whereas harvesting of cowpea seeds is recommended at 23 days after anthesis to obtain maximum recovery, germination and vigour based on two years data at IIVR.
- On the basis of two years' study at Solan centre, it is recommended that storage of bell pepper cultivar California Wonder seeds is best when stored in polythene bag (200 gauge) in refrigerator after treating with 0.3% Thiram whereas storage of onion cultivar Nasik Red seed is best when stored in polypet jar in deep freezer -20°C after treating with 0.3% thiram.
- On the basis of two year studies at Solan centre, it is recommended that the maximum seed yield in okra cv. Pusa Sawani is obtained when the seed was treated with Carbendazim (2g/kg seed) or with 0.25% HCl dip for 30 minutes.
- At Srinagar, the treatment of onion cultivar Yellow Globe with PBA @ 10⁻⁴ M whereas at Hyderabad the treatment of chilli cultivar X-235 with PBA @ 10⁻⁶M or NaCl 10⁻⁴M was found best for enhancing storage life of these seeds.

Breeder Seed Price Fixation

Table 6: Breeder price of vegetable seeds

S.No.	Name of vegetable	Rate (Rs./kg)	S.No.	Name of vegetable	Rate (Rs./kg)
1.	Palak	90	16.	Knol Khol	400
2.	Methi	100	17.	Radish	250
3.	Okra	200	18.	Carrot	350
4.	Tomato	1200	19.	Turnip	250
5.	Brinjal	650	20.	Onion	600
6.	Chilli	700	21.	Bottle gourd	350
7.	Capsicum/Paprika	2000	22.	Bitter gourd	450
8.	Cowpea	100	23.	Sponge gourd	350
9.	Cluster bean	100	24.	Ridge gourd	350
10.	French bean	150	25.	Cucumber	800
11.	Dolichos bean	125	26.	Tinda (Round melon)	200
12.	Garden pea	80	27.	Pumpkin	400
13.	Early Cauliflower	1000	28.	Muskmelon	450
14.	Late Cauliflower	2000	29.	Water melon	550
15.	Cabbage	600	30.	Coriander	100

Breeding for resistance

After going through the summary report of the trial data, the following entries are recommended for identification and release.

Table 7: List of resistant varieties of vegetables identified during the group meeting

Sl. No.	Crops	Name of the entries	Source	Recommended zones
1.	Tomato	H-86	IIVR, Varanasi	I, IV, V, VIII
2.	Pea	KTP-8	Katrain	I, IV, V
3.	Okra	NDO-10	Faizabad	IV
4.	Okra	HRB-107-4	Hisar	VI, VII, VIII



H-86 (Kashi Vishesh)



KTP-8



NDO-10



HRB-107-4 (Hisar Naveen)