

XXXI-Workshop

Venue : CSK HPKVV, Palampur (H.P.)

Date : 2nd - 5th May, 2013

Collection, Evaluation, Conservation & Utilization of Germplasm

List of promising germplasm available with different centers (2012-13)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Amaranth		
Jabalpur	9	Yield- (g/ plant)-JAS1 (225.0, green leaf), JAS5 (195.0green leaf)
Coimbatore	87	Max. Yield- (g/per 10 plants)-A155 (280.9, G), A159 (248.3, Green)
Hyderabad	32	Max. Yield- (g/per 10 plant)-IC257793 (330.0 g), IC257791 (290.0 g) Max. Stem Yield- (g/per 10 plants)-IC257789 (3450.0), IC257796 (2600.0)
Jorhat	13	Am-1 and Am-2 (highest yielder)
HARP	15	Max. Yield (q/ha.)- HAAMTH-48 (409.38, Greenish Red), and HAAMTH -15 (300.03, Red) Check- Yield (q/ha.)- Pusa Lal Chaulai (225.01), P. Kirti (212.05 & P. Kiran (200.94)
Vellanikkara	15	Max. Yield- (g/per plant)-VKA-113 (305.0) with 45 cm plant height, VKA91 (285.0)
Jabalpur	9	Yield- (g/ plant)-JAS1 (225.0, green leaf), JAS5 (195.0green leaf)
Bitter Gourd		
IIVR	54 (old) 6 (new)	Yield/plant (g) VRBTG11-3 (1985.0) and VRBTG-11-1 (1800.0)
Vellanikkara	2 (New) 15 Evaluated	Earliness (50% flowering)-VKB-184-green & Preethi-white (63 days), Days to First Harvest- VKB192 (73 days) VKB-184 (75 days) Yield/plant (kg) – VKB-176 (2.50), Preethi (1.85) Resistance to mosaic-VKB 135
Rahuri	14	Yield/ha (q) – Hirkani-Dark green (231.94 kg), Co White Long (220.74 kg)
Bottle Gourd		
IIHR	22	Yield/plant (kg) : IIHR71 (11.40) and VRBTG-11-1 (1800.0) Ist Hravest (day) : IIHR 67, IIHR 53 & IIHR 45 R (65) Bitter Fruit : IIHR 58
Faizabad	30 (old) 2 (New collection)	Earliness : NDBG5041 (No unit) High Yield : NDBG5041 (No unit) Tolerant to downy mildew: NDBG5041 (No unit)
Rahuri	33	Yield/plant (kg) :RHRBG-18 (9.87), RHRBG 25 (9.57) Earliness (50% flowering): RHRBG6 (68), RHRBG18 (69)
IIVR	69 (old)	Yield/plant (kg) : VRBG12-13-3 (4.985), VRBG-12-13-2 (4.392) Fruit length(cm): BRBG12-13-3 (17.0, Small)
Cucumber		
IIVR	30	Earliness (50% flowering): VRC19 (39), SKY/DR/RS131 (40) Yield /plant (g): SPP 58 (850.40), Super Vigour (605.0) Max. fruit wt.- SKY/DR/RS131 (330.6)
Pantnagar		Non Reporting
Rahuri	34	Earliness (50% flowering): RHR-29 (38.33 days), RHR-21 (42.0 days) Fruit length: Max. RHR-6 (39.18 cm) Fruit length: Min.- RHR-23 (9.18 cm)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Solan	4	Yield (q/ha.): LC-37 (498.45), LC-35 (376.5) Fruits/plant : LC-37 (8.26), LC-35 (7.67) Max. Fruit length (cm)- LC-37 (27.56) Mini.. Fruit length (cm)- LC-36 (12.92)
Pointed gourd		
IIVR	14	Promising : IIVRPG92, IIVRPG105, IIVRPG109, IIVRPG113
Bhubaneshwar	12	Yield/pl. (kg)- BPG-4 (1.050), BPGAN-02 (1.020) Max. Fruit Length (cm)- BPGAN-02 (6.91), BPG-4 (6.74) Max. Fruit girth (cm): BPGAN -02 (11.9), BPG-8 (1182) Fruit wt. (g): BPGAN -02 (23.2), BPG4 (22.7)
Kalyani	24	Vit. C (mg/100 g): BCPG24 (29.76), BCPG12 (29.64) Earliness (Days to 50% flowering): BCPG-9 (91), BCPG-15 (92) BCPG-5 (85) Max. Yield (q/ha): BCPG-4 (6672.4), BCPG-5 (648.4) Fruit length (cm): BCPG6 (10.12), BCPG2 (5.92) Vine & fruit Rot (Mini. Intensity%)- BCPG-4 (11.00), BCPG-23 (11.3)
Faizabad	7	Yield (q/ha): NP-520 (295.0), NP-260 (280.0)
Sabour	18	Yield (q/ha) – Rajendra Parwal (168.5), Rajendra Parwal-2 (160.25) Fruit Length (cm)- Rajendra Parwal-1 (9.80); 2000-01 (7.30) Average fruit wt. (g): Rajendra Parwal-1 (40), 2008-01 (35)
Jorhat	5	Genotype could not survive
Navsari	17	Yield/pl. (kg)-NPG9 (3.08), NPG5 (2.64)
HARP		Non Reporting
Ridge gourd		
IIHR	15	Yield (kg/pl.): IIHR42 (3.00), IIHR53 (2.48) 1 st Female flower emergence (days): IIHR55 (50), IIHR53 (54.2) Fruit length (cm) Max.: IIHR58 (39.9), IIHR 53 (33.4) Fruit length (cm) Mini.: IIHR43 (5.4)
Rahuri	12	Av. Fruit wt.: Local sel.1 (115.26) Fruits/vine: Utkal Ttrupti (18.5,) Local sel.1 (17.05)
Ivy gourd		
Vellanikkara	3 (New) 12 Evaluated	Earliness (First harvest days): CG-101 (44 days), CG-23, CG9, CG27 & CG-100 (45 days) Fruit Yield (kg/pl.): CG-23 (17.60), CG-82 (16.50) Resistance to mosaic- CG-84 (Highly bitter fruit) Individual fruit weight (g)- Max. CG-101 (19.00), CG-82 (18.5)
Raipur	32	Yield/plant (kg): 05 (24.88), 52 (24.43) Fruit Weight (g) Max. Acc. 48 (25.0), Acc.-52 (23.0) Earliness (first harvest)-Acc. 35 & Acc. 36 (71), Acc.15 (72),
Navsari	19	Yield (kg/pl.) – NLG-16 (2.92) released as variety-GNLG1, NLG-5 (2.5)
Port Blair		Non reporting
IIVR	13	
Dhardwad		Non reporting
Vellanikkara	3 (New) 12 Evaluated	Earliness (First harvest days): CG-101 (44 days), CG-23, CG9, CG27 & CG-100 (45 days) Fruit Yield (kg/pl.): CG-23 (17.60), CG-82 (16.50) Resistance to mosaic- CG-84 (Highly bitter fruit) Individual fruit weight (g)- Max. CG-101 (19.00), CG-82 (18.5)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Muskmelon		
IIVR	30	Yield/ plant (g.)- IIHR660 (1412.1), VIIIHR-GPW12 (1395), Days to 5% flowering (days): IIHR-HM (40), MJ7 (40) Fruits/pl. - IIHR6604.7)
Durgapura	3	Fruit wt. (g): DMM-1 (8.5), DMM 2 & DMM 3 (8.0) TSS (% brix) : DMM-1 & DMM 2 (12.0), DMM3 (11)
Ludhiana	10	Max. Fruit wt. (g)-MM DURASOL (1200), MM3917 (1100) High TSS (% brix) - MM NARIKE Coll.1 (14), MM3864(12) Netted Type: MM2011-4, MM3917
Rahuri	42	Yield (q/ha) : RHRMM-39 and RHRMM 42 (691.04) High TSS (% brix): RHRMM-2 (12.3) Fruits/plant : RHRMM-32 (10) Flesh colour Light Green- RHRMM-1, RHRMM-4, RHRMM-6, RHRMM-9, RHRMM-15 Orange- RHRMM-2, RHRMM-3, RHRMM-5, RHRMM-8, RHRMM-10, RHRMM-12 White- RHRMM-44 Netted Type: RHRMM-2, RHRMM-3, RHRMM-4, RHRMM-5
IIHR		Non Reporting
Pumpkin		
IIVR	110 (old) 50 Evaluated	Yield /pl. (kg). : VRPH 15-1 (14.37), VRPH-15 (11.04) Fruit/plant : VRPK 5-1 (15), VRPK-9-1 (12), VRPK-02 (8) Earliness First female flower-VRPK-5-1 (36 days) Fruit wt. (kg): Max.VRPK-310 (5.0) Mini.VRPK-05-1(1.3) Flesh Thickness (cm):VRPK-401(5.2),VRPK-67 (5.0)
Faizabad	20 (old) 2 (new)	NDPK-5006-3: Polar length 27 and circumference 63 cm Tolerant to downy mildew & cucumber mosaic virus No Details report
Coimbatore	15	Yield/Pl. (kg): ACC 15 (14.70), ACC 5 (13.82) Flesh Thickness (cm): ACC 3 (3.58) Seed containing -Mini. ACC-1 (132.6) Max. ACC8 (377.3) Earliness 1 st female flower: ACC 13 (43.0 days) Fruits/plant: ACC 15 (4.9), ACC 8 (4.66)
Watermelon		
Durgapura	3	Fruit Wt. (kg): DWM53 (2.75), TSS 12%, Oblong DWM52 (2.5), TSS 11 %, Oblong DWM51 (2.0), TSS 12 % , Flat Flesh colour of all genotypes: Red
IIVR		Non reporting
IIHR		Non reporting
Cho-Cho		
ICAR, Resh. Complex Barapani	6 (old) 2 (new)	Fruit Wt. (Range). 210-475 g.
Jorhat	-	Non reporting

FOUR DECADES... ACCOMPLISHMENT OF AICRP ON VEGETABLE CROPS

Crops/Source	No. of germplasm	Notable/Promising germplasm
Brinjal		
Vellanikkara	17	Yield / plant (kg): VKBr3 (4.75), VKBr12 (4.5) Days to 50% flowering : VKBr1 (38), VKBr41 (41) Bacterial wilt resistance: VKBr1,VKBr5,VKBr10,VKBr12,VKBr15 and VKBr 18
Bhubaneshwar	65	Yield / plant (kg): BBSR195 (1.68), BBSR2002-1 (1.56) Days to 50% flowering: SM6-6 (76.0) Days to edible maturity: SM6-6 (92.0) Bushiness/ plant height: IG (58.4 cm)
IIVR	90	Yield / plant (kg): IC385272 (4.7), IC89832 (3.6) Fruits/plant: IC334658 (40), IC111056 (30)
Raipur	76	Yield / plant (kg):IGB25 (1.245), IGB 51 (1.243) Flowering (days): IGB 11 (47), IGB41 (47) Round big: IGB-9, IGB-14, IGB-37 Oblong: IGB-1, IGB-7, IGB-19, IGB-20
Kalyani	29	Yield / plant (kg): IC059490 (9.71), IC0594925 (2.29)
Rahuri	20	Yield/ha (q): Krishna Kathi1 (303.48), RB24 (292.8) Days to 50% flowering: Green round (64.7), Kranti (77.9) Fruit borer (weight basis) Least Loss: PB61 (28.8)IAB20 (29.6)
Chilli		
Jorhat	15	Seven promising (No details about traits)
IIVR	400	Resistance to Anthracnose and PepLCV: Bhut Jolokia 1-GMS lines: CMS (9 set, A &B) 2-GMS Line: (MS-12 &MS-3)
Srinagar	94 (old) 4 (new)	Yield/pl. (g): SH-KC-75 (450), SH-KC-74 (420) Fruits/plant: SH-KC-73 (75), SH-KC-74 (70) Bushiness (Plant spread): SH-KC-72 (28 cm) Fruit length (cm): Max. SH-KC-75 (10.0) and Mini. SH-KC-72 (8.82)
Barapani	20 evaluated 16 (new)	Yield/pl. (g): BEC (455.0) No details of other genotype
Dharwad	21	Yield/pl. (g): HUC-17 (397.09), HUC-21 (350.64) Fruits/plant: HUC-17 (121) Fruit length (cm): HUC-19 (11.93)
Lam	46(old) 5 (new) 300 (total)	Yield/pl. (g): N GP-29 (155) and NGP-26 (115) No other traits described
Coimbatore	114	Yield (Riped, g/pl.)-CA 25 and CA41 (1.933)
IIHR	20	Highly pungent (A. Lohit) others are mild Thrips tolerance (A. Lohit) others are susceptible All genotypes are susceptible to Alternaria, Cercospora, Colletotrichum, Leveillula sp., CMV, mites and thrips
Kalyani	12	Days to 50% flowering (days): IC0594882 (34), IC0594880 (35) Green fruit yield / plant (g): IC0594885 (250.80), IC0594879(242.15) Dry fruit yield / plant (g):IC0594883 (4.02) Vit. C: IC0594881 (2.987), IC05948 86 (1.397) Phenol (mg/g) in ripe fruit IC0594874 (0.214) Carotene (mg/g) of fruit IC0594883 (0.913), IC0594887 (0.810) Capsaicin (mg/g) pf ripe fruits IC05948 87 (7.233)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Rahuri	25	Yield/plant (4): AC 60-01 (546), AC 10-3 (464) Days to 50% flowering (days): AC2 (55), GK2-3 (54) Fruit length (cm) Max. PC56 (10.34)
Palampur	30	Free from Bacterial wilt : Plp-CH-VVG-11, Plp-CH--CH-15-11, Plp-CH--CH-34-11 Male sterile: MS12
Capsicum		
Srinagar	4	Yield/pl. (g): SH-SP-54 (600), SH-SP-56 (520) Fruits/plant: SH-SP-54 and SH-SP-56 (12) Bushy plant (Pl. Spread cm): SH-SP-55 (61) & SH-SP-54 (62)
Solan	6	Yield/ha. (q): Cazio collection (383.33) & Acc. 16 (340.00) Fruits/plant: Cazio collection (23) Average fruit Wt. (g): Acc. 16 (70.8)
Katrain	2	Yield/ha. (q): EC 646884 (227.65) & EC646885 (210.67) Average fruit Wt. (g): EC646885 (71.42)
Palampur	4	50% flowering (days): PJC4 (36) and PJC 5 (39) First Picking: PJC4 (62) Yield/pl. (g): PJC1 (807.51) and PJC4 (722.60)
Paprika		
Srinagar	4	Yield/pl. Red ripe (g): SH-P-33 (399) and SH-P-52 (390) Fruits/plant: SH-P-52 and SH-P-53 (20) Fruit length (cm): SH-P-52 (11.20) and SH-P-53 (10.40)
IIHR	4	Fruit colour : Dark red (EC631776) Pungency (0%): EC631776 and EC631777
Katrain	2	Yield/ha. (q): DS-6 (217.56) and EC646886 (160.67) Average fruit Wt. (g): EC646886 (44.44) and DS-6 (42.85)
Pea		
Ludhiana	8	Earliness 50% flowering (days): Winner (34), Late: Ambassdor (65) Pods/plant: Esprit (17.54) and Boogie (16.55) No. of grains/pod: Legacy (7.6), Boogie and Seena (7.5)
Palampur	8	Yield/plant (g): DPPMR-09-9 (70.50) Earliness (days to flowering): DPPMR-09-9 (98) and DPPMR-09-3 (99) Pod length (cm): DPPMR-09-2 (9.46) and DPPM72 (9.21) No. of grains/pod: DPPM72 (8.17) Powdery mildew resistance: DPPMR-09-1(1.0 R), DPPMR-09-2 (8.2 R), DPPMR-09-3 (7.5 R), DPPMR-09-5 (9.1 R)
IIVR	50	Yield/plant (g): VRP14 (76), VRP285 (66) and SR-74 (64) Earliness (days to flowering): VRP-86 (46) & Late: VRP-32 (81) No. of pods/plant: VRP283 (16) and No. 6 (15)
French bean		
IIHR	16	Yield/ha (q): IIHR-238 (149), IIHR-240 (128.5) Earliness (days to 50% flowering): IIHR-235, 242, 244 & 245(31) Pod length (cm): IIHR-238 (17), IIHR-242 (16.3)
Barapani	49	Yield/plant (g): RCFB 88 (235.73), MZFB-32(233.99) Earliness (days to 50% flowering): MZFB-28 (28) Pod weight (g): RCFB 34 (10.85), RCFB88 (10.76)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Dharwad	11	Yield/plant (g): HUFB-3 (344.67) and HUFB1 (252.78) Earliness (days to 50%flowering): HUFB-4 (36.67) Pod length (cm): HUFB6 (17.89) Pods/plant: HUFB-3 (50.22)
Pantnagar	22	Yield/ha (q): FB-57 (107.52), FB-63 (101.75) Earliness (50% flowering): FB48(59) Pods/plant: FB-63 (13.33), FB-61 (13.13) Pod length (cm): FB48 (10.57)
Rahuri	48	Pods/plant: RHRFB-32 (074.3) Earliness (50% flowering): RHRFB-6, RHRFB-16, RHRFB-39 (43) Pod length (cm): RHRFB-43 (13.20), RHRFB-26 (13.12)
Lab lab bean		
Dharwad	10	Yield (Q/ha): HUD 9 (205.81), HUD 10 (196.95) Days to 1 st flowering -HUD 8 (87), HUD 2 HUD 6 (98.67) Pod Length (cm)-HUD7 (9.38), HUD 9 (9.29)
HARP	32	Yield (q/ha.): HADB103 (226.67) Days to 1 st pod harvest- HADB 106, HADB120, HADB122, Pod length (cm)-IC249522 (16.56) Pods/pl.- EC305789 (434)
Raipur	63	Days to 50% flowering -IS-21 (48) Pod yield (Q/ha)-IS-18 (151.94)
Jabalpur	25	Days to 50% flowering -JDL-18 (40), JDL-19 (45), JDL20 (460) Yield/pl.(g)-JDL9(680), JDL8(680)
Okra		
IIVR	395	Yield/pl. (g): IC 111547° (147), EC 305645 (138) & EC169511 (137) Fruits/pl.: EC305645 (19.8), IC111480 (18.0) & IC117224 (17.2) YVMV & insect damage Free genotypes: IC140986, IC141056, IC140985, EC316077 Minimum node flowering: IC305628 Short internodal genotype: IC117229, IC18532, IC11720 & IC31037A Lowest jassid population: VROB181 (5.2 jassid/leaf), VROB108 (5.9) Lowest fruit & shoot borer: SB-6 (1.2 borers/plant)
Dharwad	10	Yield/pl. (g): HUB-7 (218.63), HUB-2 (213.32) Earliness (days to 50%flowering): HUB-2 (41.33)
Rahuri	200	Minimum fruit length (cm): IC282292 (9.00), EC133408 (9.00)
Bhubaneswar	54	Yield/pl. (g): Niali local (201.8) & BBSR 50 (189.7)
Carrot (Temperate)		
Srinagar	5	Root yield/ha (q): SH-C-159(256.25), SH-C-161 (249.38) Root Wt. (g): SH-C-159 (64.00) and H-C-161 (62.35) Root length (cm): SH-C-159 (15.36)
Solan	8	Root yield/ha (q): SOL-CT-1 (244.82), Solan Rachana (241.57) Medium long Root: SOL-CT-1 (21.73)- Orange colour root , root Wt. 147.56 g & free from defects
Katrain	10	Root yield/1.67square meter (kg): KS-64 and KS-37 (3.900) Root length (cm): KS-37 (19) All genotypes are orange colour

Crops/Source	No. of germplasm	Notable/Promising germplasm
Cauliflower		
Sabour	4	Curd Size (Below 10cm dia.)-Total Acc. 11 Above 10 cm dia. -Total Acc. 08 The genotypes 84-3, 91-2, 93-2, 95-3, 98-1, 2002-1, SBECF-1/09 and 2006-2 having curd weight 280-460 g.
RAU, Pusa	10	Hugh yielding genotypes : RECF-2, RECF-4 and RECF-5 Curd weight : Smallest RECF-1(386.8), RECF-18(415.1), RECF-13 (420.3)
Centre Allotted (3) (Mid) Non reporting centre: IIVR, RAU Pusa	Sabour(72)	Curd Size (Below 15cm dia.)-Total Acc. 08 Above 15 cm dia. -Total Acc. 10 The genotypes 94-2M, 96-5M, 97-1M, 99-1M, 2001-5M, 2007-1M, 2007-5M, 2008-1M, SBMCF-2/10 and SBMCF-1/11 having curd weight 505-585 g.
Solan	72 (old) 2 (new)	Net curd Wt/plant (kg): ACC-333 (1.00) Earliness (days): CC-36-1 (110)
Katrain	10	Max. Curd Wt. (g): EC683456 (830), EC683460 (630) Yellowish curd: EC683457, Earliness (maturity days): EC683457(85), EC683459 (92)
Cabbage		
Solan	6	Yield /ha (q): Sel.8 (378.286) & Sel. 204 (331.37) Net Head weight (g): Max.-Sel. 8 (1854.67) Lowest Invento (850.0)
Katrain	84	Net Head weight (g): Max. EC664345 (2.441), EC 616592 (2.250) & EC616610 (2.00) Days to 50% heading (earliness): EC686498, EC616593EC616595 (all 43 days) Male sterility: 75% genotypes are male sterile
Cowpea		
IIHR	20	Yield/ha. (t): IIHR-247 (22.6) & IC471950 (20.2) Earliness (First harvest): IC471955 (62 days) Pod length (cm) Max. IIHR 133 (75), IIHR249 (57) Purple pod colour : IIHR114, IIHR115 (others are green)
IIVR	315 (old) 11 (new)	Yield/plant (g): KVCP-2 (167.48) KVCP-21 (142.92) & KVCP- 33 (138.4) Earliness (First flowering): KVCP-70 (37.0) KVCP-5 (38.0) & KVCP-1(39.7) Pods/plant Max. KVCP-2 (15.8) & KVCP-16 (14.2) Pod length (cm) Max. KVCP-33 (42.4) & KVCP-70 (39.8) Heaviest pod (g): KVCP-2 (11.0) KVCP-33 (10.8) Free to Golden Mosaic Virus: KVCP-1, KVCP-5 & KVCP-33
Raipur	38	Yield/plant (g): ICP-2 (146.04) ICP-14 (144.95) Earliness 50% flowering (days): ICP-22 (39.22), ICP-13 (41.44) Pods/cluster: ICP-33(4.67) & ICP-29 (3.87)
Spine gourd (<i>Momordica dioica</i>)		
Bhubaneshwar	6	Yield/plant (kg): BSG-3 (1.6100) Fruit Length x Girth (cm):BSG-3 (4.6 x 7.2), BSG-4(5.2 x 6.80) Av. 5 fruit Wt. (g): BSG-3 (81.4) & BSG-2 (70.6)
Jorhat	20	Yield/ha. (q): GB16-01/09 (135.54), GB18-08/09 (134.20) Earliness first flowering: GB16-01/09 (51), GB16-01/09 (62) Fruit Length x Dia. (cm): GB 18-05/09 (11.3 x 5.4)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Kalyani	20	Fruit yield (Kg/pl.)-BCSG-1 (2.65), BCSG-13 (2.18) Fruits/plant- BCSG-1 (30), BCSG-2 (25) Earliness (Days to 50% flowering) -BCSG-1 (72), BCSG3 (80)
Navsari	49	Av. Weight of fruit (g): NSC-6 (15.40)
Drumstick		
Periyakulum	9	Yield/ha (t): Acc. No.4 (11.63), Acc. No. 2 (9.88) Yield/plant (kg):Acc. No.4 (29.07), Acc. No.2(24.70) Pods/plant: Acc. No.4 (311.10),
Vellanikkara	22	In field only 14 established

List of promising germplasm available with different centers (2011-12)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Amaranths		
Jorhat	6	High :yield : Am-1 and Am-2 (No value) Leaf number/plant: Am-33(183) and Am-21 (161) Plant height (cm): Max. Am-4 (74.6) and Mini. Am-21 (28.6)
Hyderabad	42	Leaf yield/plant (g) : RNT-26 (254), RNT-3 and RNT-7 (250) Plant height (cm): Highest RNT-1 (98.0), RNT-53 (97.0), RNT-6 (96) Lowest :RNT-7, RNT-20 and RNT-139 (41)
Coimbatore	111	Yield/plant (g): A2 (236.7) Plant height (cm): Highest: A177 (247.7) , A3 (244.9) Lowest (cm) :A12 (43.7) and A81 (44.2)
Vellanikkara	14	Yield/plant (g): VKA6 (650), VKA44 (545) Plant height (cm): Highest: VKA1 (78.6)VKA45 (60.2) Lowest (cm) :VKA67 (26.6)
Bottle gourd		
IIHR	5	Yield/plant (kg): IIHR-75 (9.9), IIHR-78 (9.0)
Cucumber		
Solan		Yield/ha. (q): LC-37 (498.45), LC-35(376.0) Fruit length (cm): Max. LC-37 (27.56), LC-38 (25.72) Fruits/plant : LC-37 (8.26), LC-35 (7.67)
Pointed gourd		
Jorhat		Reported 5 genotypes but no detail reports
Bhubaneswar		Yield/pl. (kg): BPG-4 (1.380), BPG-5 (0.980) Fruit Wt. (g): Max. BPG-4 (30.4) Fruit Length x Dia. (cm): BPG-4 (8.12 x 3.18)
Ridge gourd		
IIHR	6	Yield/plant (kg): IIHR-69 (2.49), IIHR-71 (2.21), IIHR-68 (2.20) Fruits/plant : IIHR-69 (13.8), IIHR-71 (11.150) Lowest node for female flower: IIHR-71(5.15) Earliest female bearing line: IIHR-68 (40.8)
Ivy gourd		
Raipur		Yield/plant (kg): Acc. 05 (25.49) & Acc.35 (21.11) Days to first harvest (days): Acc.37 (71) Fruits/plant: Acc.5 (2377)
Muskmelon		
IHR	11	Fruit Wt. (g): IIHR738 (800), IIHR707, IIHR756 and IIHR 619 (500) TSS (%): IIHR707 (8.8), IIHR738 & IIHR 758 (8.5)

Crops/Source	No. of germplasm	Notable/Promising germplasm
Watermelon		
IIHR	5	First female flower(days): IIHR20 (40), IIHR58 (46) TSS (%): IIHR55 (9.5), IIHR128 (8.7)
Tomato		
Hyderabad	50	Yield/ plant (kg): EC50055 (2.661), EC164672 (1.35) Fruit Wt. (g): EC521068 (94.2), EC528367 (84.2)
Solan	5	Yield/ha (q): 97/754 (355.5), EC5335580 (270.8) TSS (Brix): CH155 (4)
Coimbatore	114	Yield/ plant (g): LE-231 (2924.0) LE-1150 (2534.6) Days to 50% flowering: LE-477 (55.3) LE598 (55.5) No. of fruits/plant:LE1150 and LE231 (70)
Brinjal		
Raipur	76	Yield/ plant (g): IGB25 (1287.33), IGB51 & IGB53 (1285.6) Earliness 50% flowering (days): IGB-9 (43.2) No. of fruits: IGB-30 (29.21), IGB-20 (25.89)
Rahuri	30	Yield/ha (q): Aruna (321.32), RB-24 (292.4) Earliness 50% flowering (days): A. Navneet (63.48), RHR 1-6-8-1 (64.17) Fruit borer infestation No. basis :Less:-Hisar-1 (29.88) LAB107-2 (30.19)
Kalyani	54	Yield/ plant (kg): 10/BRL/VAR-7 (2.56), IC594925 (2.41)
Bhubaneshwar	88	Yield/ha (q): BBSR09-6 (391.9), BBSR 10-12 (343.6) Earliness 50% flowering (days): SM6-6 (74) Av. Fruit Wt.: BBSR 09-17 (66), BB68 (49.6)
Vellanikkara	15	Yield/ plant (kg): VKBr-31 (4.75), VKBr-12 (4.5) Resistant to bacterial wilt: VKBr-3, VKBr-7, VKBr-24, VKBr-17
Chilli		
Kalyani	15	Green fruit yield/plant (g): IC594886(262.35), IC594883 (248.25) Earliness 50% flowering (days): IC594882 (36) IC594880(37.0) Vit. C (mg/100g of green fruit):IC594882 (59.06), IC594883 (52.20) Carotene (mg/100g of green fruit): IC594883 (92.0), IC594887 (81.62)
Srinagar	4	Red ripe fruit yield/ plant (g): SH-KC-79 (430), SH-KC-78 (410) Fruits/plant: SH-KC-79 (82),) : SH-KC-78 (69) Fruit length: SH-KC-79 (10.10)
Rahuri	29	Yield/ plant (g): AC-60-01(546.00), AC-10-3 (464.00) Fruits/plant: Utkal Yellow (386), P, Jawla (280), S-1-3-2 (200) First Harvesting (days): AC-2 and GK-2-3 (75)
Lam	300 (old) (46 new)	Yield/ha (q): HRSD CH-8 (170.5), BSS-453 (150.37) Fruits/plant: HRSD CH-9 (142), HRSD CH-1 (136.79) Earliness 50% flowering (days): HRSD CH-5 (62)
IIHR	11	Virus -CMV and CVMV (chilli veinal mottle virus): 12/HRHP1 12/HRHP2 (both are tolerant)
Coimbatore	114	Yield/ plant (kg): CA25 (1.914) Fruits/plant: CA25 (312.1) CA15 (291.3)
IIVR	54	Fruits/plant: SDA163 (58.33), SDA (193)
Capsicum		
Srinagar	4	Yield/ plant (g): SH-SP-60 (690), SH-SP-58 (592) Fruits/plant: SH-SP-60 (13), SH-SP-58 (12)
Katrain	4	No detail report
IIHR	13	Red fruited genotype: 12/IHRBP2, 12/IHRBP5, 12/IHRBP6

FOUR DECADES... ACCOMPLISHMENT OF AICRP ON VEGETABLE CROPS

Crops/Source	No. of germplasm	Notable/Promising germplasm
Solan	6	Cazio Collection: Max. No. of fruits (23.00) and Max. yield (383.33 q/ha) ACC-16: Max. fruit Wt. (70.00 g)
Paprika		
Srinagar	4	Yield/plant (g): SH-P-55 (420), SH-P-57 (400) Fruits/plant: SH-P-57 (23)
Katrain	2	No detail report
IIHR	8	Dark Red:12/IHRP1, 12/IHRP2 Fruit length (cm): 12/IHRP3 (9.1), A. Lohit (9.3)
Pea		
Ludhiana	2	First flowering (days): Aryaveer (60), RE89 (65) No. pods/plant: Aryaveer (41.2), RE89 (22.4)
French bean		
Rahuri	50	No. of pods/plant: RHRFB44 (73.2), RHRFB32 (72.2) Pod length (cm): RHRFB28 (17.5), RHRFB1 (15.9) Earliness 50% flowering (days): RHRFB15 (37), RHRFB10, 11, 18, 28 (39)
Dharwad	10	Yield/ha (q): A. Anoop (193.7), HRSB-FB-4 (184.17) HRSB-FB-2 (171.5) Earliness 50% flowering (days): HRSB-FB-2 (37.67), HRSB-FB-1 (38.0) Pod length (cm): HRSB-FB-5 and 3 (20.78) Pods/plant: A. Anoop (53.99), HRSB-FB-4 (47.78)
IIHR	38	Yield/ha (q): IIHR 278 (162.0), IIHR270 (152.0) Pod length: IIHR278 (20.0), IIHR291 (19.5) Earliness 50% flowering (days): IIHR272 (40), IIHR263 (42)
Okra		
IIVR	67	Yield/plant (g): KS410 (362), 113-81 (350.0) Fruit/plant : KS410 (19.83)
Bhubasneswar	50	Yield/plant (g): BBSR3 (221.2), BBSR50 (202.8) Earliness 50% flowering (days): BO2 and BBSR09-16 (41) Fruits/plant: JOL2K-19 (20.8)
Carrot Temperate Type		
Srinagar	5	Root yield/ha (q): SH-C-164 (269.2), SH-C-163 (264.18)
Katrain	10	Root yield/10 roots (kg): KS-68 (1.8), KS35 (1.78)
Solan	10	Root yield/ha (q): SOL-CT-6 (249.54), Solan Rachana (249.5) Root length (cm): SOL-CT-9 (29.28), SOL-CT-3 (28.85)
Cauliflower (Early)		
RAU, Pusa	11	Curd Weight (g): RECF-2 (652), RECF-5 (595.4)
Cauliflower (Mid)		
Sabour	8	Curd Weight (g): SBMCF-2/10 (590), 96-5M (582)
Cauliflower (Late)		
Katrain	8	Curd Weight (kg): EC656862 (1.25), EC656864 (1.21) Days to maturity: EC656867 (131), EC656865 (136)
Solan	2	Yield/ha (q): King-King (296.2), Autumn Giant (266.6) 50% curd emergence (days): Autumn Giant (90) King-King (115),
Cabbage		
Katrain	10	Head Weight (kg): EC616662 (1.29), EC 616649 (0.997)
Solan	6	Yield/ha (q): AC16 (394.7), KK3 (387.45) Marketable maturity (days): AC16 (81), AC9 (90.67)
Cowpea		
IIVR	315 (old) 7 (new)	Pod Yield /plant (g): VRC439 (289.8), VRC438 (278.5) Longest & Heaviest pod: VRC-435(45.2cm & 11.3 g), VRC-431 (43.5cm & 11.0 g) Earliness (Days to 50% flowering): VRC-436 (35), VRC-4405(36) Resistant to golden mosaic virus (Field): VRC-426, RGC-4 & KPC-10

Crops/Source	No. of germplasm	Notable/Promising germplasm
IIHR	27	Yield /pl.(g): IIHR310(163), A. Mangala (228) Pod Length (cm): IIHR79 (63), IIHR91 (56) Earliness (pod maturity in days): IIHR317(45), Pod length (cm) Max. IIHR321(32.5), A. Mangala (76)
Raipur	38	Yield/plant (g): ICP-38 (154.43), ICP-2 (150.71) Earliness (Days to 50% flowering): ICP-38 (39.89), ICP-22 (40.22)
<i>Momordica dioica</i>		
Bhubaneswar	5	Yield/plant (kg):BSG-3 (1.25), BSG-2 (0.84) Fruit length x fruit width (cm): BSG-3 (3.38 x 2.4), BSG-2 (3.32 x 2.2)
Jorhat	15	Yield/ha. (q): GB16-01/09 (130.25)GB18-08/09 (128.3) Days to first flowering: SpG-04 (60), GB16-01/09 (61)
Drumstick		
Periyakulum	15	No. of pods/tree: (311.1), No name of genotypes given.

Vegetable Production

Based on the two/three years consistent data following recommendations were emerged out:

IPNM in Tomato

- At Bhubaneswar**, five years continuous study during Rabi season (2008-09 to 2012-13) on non-staked tomato cv. Utkal Kumari under sandy loam soil showed that the maximum fruit yield (364.10 q/ha) along with highest B:C ratio (3.91) was obtained with the application of NPKrec.(120:60:80 kg/ha) + soil incorporation of Sulfur @ 25 kg/ha at the time of final field preparation. Hence, it is recommended as IPNM package for tomato under Bhubaneswar conditions of Zone-V.
- At Kalyanpur**, three years continuous study during Rabi season (from 2010-11 to 2012-13) on sandy loam soil and non-staked tomato cv. T-6 (determinate) revealed that the maximum fruits yield (308.73 q/ha) and B:C ratio (2.92) was obtained with the application of NPKrec.(120, 60, 80 kg/ha) + FYM 10 t/ha + soil incorporation of Sulfur @ 25 kg/ha at the time of final field preparation + Azotobactor (soil application @5kg/ha) at the time of final field preparation + 3 sprays of mixture of micronutrients (Zn +B +Fe +Cu +Mn, each 100 ppm + Mo 50 ppm) at 30, 45 and 60 DAT (Days after transplanting). Hence, above treatment combination is recommended for Kalyanpur conditions of Zone- IV.
- At Sabour**, the three years data (2010-11 to 2012-13) during Rabi season on non-staked tomato cv. Swarn Lalima in sandy loam soil observed that the application of NPKrec. (120:60:80 kg/ha) + FYM 10 t/ha + soil incorporation of Sulfur @ 25 kg/ha at the time of final field preparation + mixture of all micronutrients (Zn +B +Fe +Cu +Mn, each 100 ppm + Mo 50 ppm) produced the maximum fruit yield (533.68 q/ha) with B:C ratio of 3.65. Hence, it is recommended as IPNM package for tomato cultivation under Sabour condition of Zone-IV.



INM in tomato at Bhubaneswar

IPNM in Carrot

- At Srinagar**, two years study (2010 and 2011) on carrot cv. Early Nantes raised on ridges during August at distance of 30 x 8 cm produced maximum root yield (246.45 q/ha) along with B:C ratio of 3.29 by application of NPK rec.(120:60:60 kg/ha) + Vermicompost 2 t/ha + biofertilizer (soil application of Azotobactor, Azospirillum and PSB each @ 5 kg per ha and VAM @ 15 kg/ha) at the

time of final field preparation. Hence, it may be recommended as an INM package for carrot in Srinagar condition of Zone-I.

IPNM in Bottle gourd

5. **At Dharwad**, three years continuous experimentation on bottle gourd cv. Arka Bahar during summer season, sown under non-staking condition at distance of 2.5 x 1.0 m gave highest yield of 229.7 q/ha along with B:C ratio 2.38 by application of NPK @50:50:37.5 kg/ha. Hence, it is recommended for cultivation of non-staked bottle gourd under Dharwad conditions of Zone-VIII.
6. **At Sabour**, three years continuous experiments (2009-2012) were conducted on bottle gourd cv. Narendra Rashmi under sandy loam soil and non staked conditions. The maximum yield of 353.02 q/ha along with higher B:C ratio (1.92) was recorded with soil application of vermicompost @ 2.5 t/ha + half NPK rec.(60:30:30 kg/ha). Hence, it is recommended for growing bottle gourd under Sabour conditions of Zone-IV.

IPNM in Broccoli

7. **At Jabalpur**, on the basis of three years experimentation (2010-2013) on IPNM in broccoli cv. Green Magic grown during Rabi season on medium black soil, it was concluded that application of poultry manure @ 2.5 t/ha + half NPK rec.(60:40:30 kg/ha) at final field preparation produced the maximum head yield (205.02 q/ha) and B:C ratio (4.58). Hence, it is recommended as INM package for broccoli in Jabalpur conditions of Zone-VII.

Low tunnel production of cucurbits

8. **At Durgapura**, three years study under low tunnel revealed that the maximum marketable fruit yield (389.72 q/ha) in bottle gourd cv. MHBG-8 with B: C ratio (3.24) was obtained when crop was sown on 30th December. While in bitter gourd cv. Mini Samrat, 15th December sowing produced the maximum fruit yield of (213.28 q/ha) with B:C ratio of 3.41. Both the crops were raised in sandy loam soil with NPK @ 140:40:40 kg/ha and FYM 20 t/ha and plant spacing of 70 x 50 cm under non-staking conditions. Hence, the 30th December sowing date is recommended for growing bottle gourd and 15th December for bitter gourd under low tunnel at Durgapura conditions of Zone-VI.
9. **At Ludhiana**, bottle gourd cv. Punjab Komal was raised continuously for four years (2008-2012) under low tunnel without staking. The maximum average yield of bottle gourd (637.1 q/ha) with maximum benefit cost ratio of 4.54 was obtained when crop was sown on 15th December. Contrary to above, bitter gourd cv. Pb.-14 has not noticed any significant improvement in yield under low tunnel condition. Hence, 15th December sowing date is recommended for growing bottle gourd in low tunnel under Ludhiana conditions in Zone-IV.

Foliar feeding of micronutrient in tomato

10. **At Sabour**, pooled data of 3 years (2010-11 to 2012-13) revealed that 3 foliar sprays of commercial micronutrient formulation @ 100 ppm (at 10 days intervals 30 days transplanting) produced the maximum fruit yield (538.99 q/ha) with B:C ratio of 3.42 in tomato cv. Pusa Rohini grown on sandy loam soil during Rabi season under non-staked condition. Hence, it may recommend for IPNM production of tomato under Sabour conditions of Zone-IV.

Foliar feeding of micronutrients in Bitter gourd

11. **At Dharwad**, three years pooled data (2010-11 to 2012-13) showed that the highest yield (106.0 q/ha) and maximum B:C ratio of 1.79 was recorded by 3 foliar sprays of Boric acid @ 100 ppm (at 10 days intervals after 30 days of sowing) in bitter gourd cv. Arka Harit during Kharif season under non-staked conditions. Hence, boric acid at 100 ppm is recommended for bitter gourd production under Dharwad conditions of Zone-VII.

Foliar feeding of micronutrients in Broccoli

12. **At IIVR**, 3 years continuous experiment (2010-11 to 2012-13) on foliar feeding of micronutrients in broccoli cv. Fiesta sown in sandy loam soil in Rabi season showed that the maximum average yield of 321.64 q/ha with B: C ratio of 4.90 was recorded with 3 foliar sprays of two micronutrient mixture together i.e. Boric Acid + Ferrous Sulphate @ 100 ppm each 30 days after transplanting over and above to the recommended dose of recommended NPK (120:60:60 kg/ha). Hence, boric acid at 100 ppm is recommended for Broccoli production under Varanasi conditions of Zone-IV.

Organic farming in okra, tomato and cowpea

13. **At Hisar**, 3 years study (2009-10 to 2011-12) revealed that the maximum yield in tomato (283.1 q/ha with B: C ratio of 2.31) and okra (94.4 q/ha with B: C ratio of 2.12) was recorded with soil application of FYM @ 20 t/ha+ VAM + Pseudomonas + Trichoderma + Azotobactor. Hence, the above treatment combination is recommended for organic production of tomato and okra under Hisar conditions of Zone-VI.

Precision farming in tomato and okra

14. **At Coimbatore**, 3 years precision farming trials on tomato during Rabi season (determinate cv. COTH 2) and okra during Kharif season (cv. COBH1) demonstrated that the maximum yield of 743.9 q/ha with the BC ratio of 3.07 in tomato, and 201.2 q/ha with the BC ratio of 1.89 in okra was achieved under treatment combination comprised of raised bed planting + drip irrigation + black plastic mulch (30 μ) + fertigation (water soluble N and K) + 5 foliar sprays of WSF (19:19:19 @10g/lit.) + 3 sprays mixture of commercial formulation of micronutrients + seedling raised in pro-tray (tomato only). Thus, the above treatment combination is recommended for realization of maximum yield in tomato and okra under Coimbatore conditions of Zone- VIII.
15. **At Ludhiana** center, 4 years studies of precision farming trial (2007-2011) was conducted on tomato (determinate cv. G-600) and okra (cv. Punjab-8) during Rabi and Kharif seasons, respectively. The maximum yield of 634.5 q/ha with benefit cost ratio 2.66 in tomato and 134.4 q/ha with benefit cost ratio of 1.2 in okra was obtained in treatment comprised of raised bed planting + drip irrigation + black plastic mulch (30 μ) + fertigation (water soluble N and K) + 5 foliar sprays of WSF (19:19:19 @10g/lit.) + 3 sprays mixture of commercial formulation of micronutrients + seedling raised in pro-tray (tomato only). Thus it is recommended for precision farming in tomato and okra under Ludhiana conditions of Zone-IV.

Use of Vermi-wash in tomato and okra

16. **At Hisar**, three years trials (2009-10 to 2011-12) on Rabi season tomato cv. Hisar Arun grown under non-staked condition reflected that the application of NPKrec.(150:80:100 kg/ha) + Vermiwash (5 sprays at 10 days interval 30 days after sowing) gave maximum yield (343.1 q/ha) with B:C ratio (2.55). Hence, it is recommended for cultivation under Hisar conditions of Zone-VI.
17. **At IIVR**, the experiment conducted continuously for three years (2010-11 to 2012-13) on use of vermiwash in okra cv. Kashi Pragati sown in sandy loam soil during Kharif season. The maximum yield (138.67 q/ha) and B:C ratio (2.60) was noticed with the application of Vermicompost @ 5t/ha (applied at the time of field preparation) + Vermiwash (5 sprays at 10 days interval 30 days after sowing). Hence, it is recommended for Varanasi conditions of Zone-IV.
18. **At Dharwad**, three years continuous study (2010-11 to 2012-13) on okra cv. Arka Anamika was conducted during Kharif season sown at spacing at 60 x 30 cm. The maximum pod yield (99.0 q/ha) and highest benefit cost ratio (1.89) was registered with the application of NPKrec. (150:80:100 kg/ha) + vermiwash (5 sprays at 10 days interval 30 days after sowing). Hence, it is recommended for Dharwad conditions of Zone-VIII.

19. **At Karaikal**, four years continuous study (2009-10 to 2012-13) on Kharif okra (cv. Hyb. No.10), sown at spacing of 30x 20 cm, gave the maximum pod yield of (161.81 q /ha with B:C ratio of 3.86) by the soil application of Vermicompost @ 5 t/ha + Vermiwash (5 sprays at 10 days interval 30 days after sowing). Thus, it is recommended for Karaikal conditions of Zone-VIII.
20. **At Hyderabad**, three years of continuous study (2009-2011) on Kharif okra sown at spacing of 60 x 20 cm the maximum pod yield in okra (104.53 q/ha) with highest B:C ratio (1.02) was achieved with use of NPKrec.(150:80:100 kg/ha) + vermiwash (5 sprays at 10 days interval 30 days after sowing). Hence, it is recommended for okra cultivation under Hyderabad conditions of Zone-V.

Organic production of amaranth

21. **At Bhubaneshwar**, four years continuous study in sandy loam soil during Kharif season (2009-2013) on *Amaranthus* var. Utkal Mayuri revealed that application of NPKrec.(150:50:50 kg/ha) resulted maximum biomass yield (136.78 q/ha) with B:C ratio of 4.74. Thus, the above treatment combination is recommended for amaranth production under Bhubaneshwar conditions of Zone-V.
22. **At Dharwad**, two years study (2011-2012) on *Amaranthus* var. Local in Red soil during Kharif season revealed that application of NPKrec. (150:50:50 kg/ha) resulted in maximum biomass yield (134.6 q/ha) and benefit cost ratio (2.94). Thus, it may be recommended for Dharwad conditions of Zone-VII.
23. **At Coimbatore**, three years study (2010-2012) during Kharif season on *Amaranthus* (var. CO-3) revealed that soil application of FYM @ 20 t/ha + PSB + *Azospirillum* (each @ 5 kg/ha) recorded the highest herb yield of 75.4 q /ha and B:C ratio of 3.0. Hence, it may be recommended for Coimbatore conditions of Zone-VIII.
24. **At Karaikal**, four years data indicated that treatment comprised of basal application of FYM @ 20 t/ha + PSB + *Azospirillum* (each @ 5 kg/ha) recorded the highest leaf yield of Amaranths (cv. CO-5) i.e. 176.38 q/ha with benefit cost ratio of 2.87. Thus, this treatment combination may be recommended for the coastal region of Karaikal of Zone-VIII.



Organically grown Amaranthus

Organic production of spinach beet

25. **At IIVR**, pooled data of 3 years (2010-11 to 2012-13) on organic production of spinach beet cv. All Green sown in sandy loam soils during Rabi season revealed that maximum average yield of 169.56 q/ha with maximum B:C ratio of 2.10 was recorded with the application of Vermicompost @ 7.5 t/ha (basal) + PSB + *Azospirillum* (soil application each @ 15 kg/ha before sowing). Hence, it is recommended for spinach beet production under Varanasi conditions of Zone-IV.
26. **At Hyderabad**, three years trial on two cultivars of spinach beet (All Green and Arka Anupama) during Rabi season observed that soil application of FYM @ 20 t/ha + Neem cake 2 t/ha in combination of PSB + *Azospirillum* (each @ 5 kg/ha) gave the highest biomass yield (334 q/ha) and B:C ratio (2.79). Hence, it is recommended for spinach beet production under Hyderabad conditions of Zone-V.

Response of cowpea to lime molybdenum and sulphur applications

27. **At IIVR**, three years continuous study (2010-11 to 2012-13) was conducted on cowpea cv. Kashi Kanchan during Kharif season sown on sandy loam soils. The maximum yield of 136.57 q/ha with

highest B:C ratio (1.44) was recorded with 3 foliar sprays of Mo @ 50 ppm (at 10 days interval 30 days after sowing) + soil application of sulfur @ 25 kg/ha as basal at final field preparation and Agriculture lime @ 1t/ha. Thus, the above treatment combination is recommended for realizing maximum yield in cowpea under Varanasi condition of Zone-IV.



Effect of lime, molybdenum and sulphur on cowpea cv. Kashi Kanchan

Hybrids Trials

The committee thoroughly scrutinized the data of the hybrid trials for the year 2009-10, 2010-11, and 2011-12 and the following entries were identified for release and notification.

Crop	Coded Name of F ₁ Hybrid	Original names	Source	Recommended Zones
Chilli	09/CHIHBY-11	VNR Vidya	VNR Seeds	IV
Tomato	09/TODHYB-04	Bhagya	Nuziveedu	VI
Bottle gourd	09/BOGHYB-04	Anurag	Nuziveedu	IV
Ash gourd	10/ASGHYB-04	DAGH-16	IARI, New Delhi	VI & VIII
Ash gourd	10/ASGHYB-03	DAGH-14	IARI, New Delhi	IV
Capsicum	10/CAPHYB-06	PRCH-101	Ranichauri	I
Cabbage	10/CABHYB-02	KTCBH-81	Katrain	I



VNR Vidya



Bhagya



Anurag



DAGH-16



DAGH-14



PRCH-101



KTCBH-81

Varietal Trials

The data for the year 2009-10, 2010-11, 2011-12 and 2012-13 was thoroughly scrutinized by the committee and following entries were identified for release and notification.

Crops	Coded name of Entries	Original Name	Source	Recommended Zones
Tomato (Determinate)	09/TODVAR-1	VRT-0801	IIVR, Varanasi	IV
Capsicum	09/CAPVAR-4	DARL-70	DIBER, Pithoragarh	I
Bitter gourd	09/BIGVAR-4	Sel-1	IARI, New Delhi	VI
Brinjal (Round)	10/BRRVAR-1	HABR-21	ICAR-RCER, Ranchi	IV



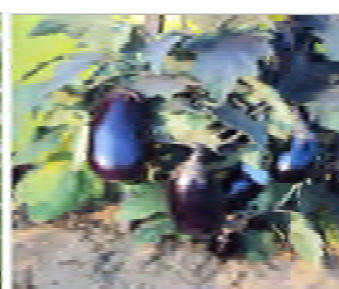
VRT-0801 (Det.)
(Kashi Aman)



DARL-70



Sel-1
(Pusa Aushadhi)



HABR-21

Resistant Varietal Trials

The following suggestions and recommendations were made during the course of discussion:

- Data on disease incidence should be recorded jointly by breeder and plant pathologist.
- Trials should be allotted only to those centres where incidence of particular disease is severe.
- The number of centres should be cut down and better performing centre should be included.
- Before submitting the new entries to the PC Cell, IIVR, at least two years evaluation data should be provided and verified by respective institute competent authority.
- It was suggested to follow the uniform criteria for recording the data on the incidence of powdery mildew in pea, yellow vein mosaic viruses in okra and leaf curl virus of tomato.
- Sick plot should be developed at some of the major centres for artificial screening of the material for wilt.
- Two susceptible and 2 resistant checks must be included in each trial
- Future work may be focused on major diseases like *Fusarium* wilt in pea, leaf curl virus in chilli, ground bud necrosis virus (GBNV) in muskmelon and watermelon bud necrosis virus (WBNV) in watermelon.
- At the time of varietal identification, other horticultural traits should be considered in addition to yield and disease incidence

Insect Pest Management (Entomology)

The following recommendations were emerged during presentation and discussion:

1. Brinjal :

1. At Ludhiana, three to four foliar application of spinosad 45 SC @ 0.5 ml/L at fortnightly interval starting from 45 DAT was most effective and reduced BSFB damage to 16.14 % and recorded highest marketable yield of 243.36 q/ha.
2. At Rahuri, five sprays of deltamethrin1 EC+ triazophos 35 EC 2 ml/L at fortnightly interval reduced the BSFB damage to 10% and recorded highest yield(345 q/ha) with C: B ratio of 1: 30.21.
3. In Hyderabad, application of rynaxpyr 18.5 @ 0.3 ml/L recorded lowest BSFB damage (17.92 %) which was at par with spinosad 45 SC at 0.5 ml/L (20.44 %) and flubendamide 39.35 SC (21.47 %). Highest yield was recorded in rynaxpyr treatment (231.96 q/ha).

2. Okra:

4. At Varanasi, the integrated module comprising of seed treatment with thiamethoxam 70 WS @ 3-5 g/kg and first spray of azadirachtin @ 3 ml/l at 40 DAT subsequent application of spinosad 45 SC @ 0.3 ml/l and *Bt* @ 1.0 g/l at 10 days interval recorded 13.47% incidence of fruit borer and jassids(13.47 jassids/leaf) with highest yield of 70.37 q/ha.

3. Tomato:

5. At Ludhiana, seed treatment with thiamethoxam 70 WS @ 3 g/kg seed or thiamethoxam 35 FS @ 10 ml/kg seed with four alternate sprays of NSKE 4% or neem soap @ 10 g/l and triazophos 40 EC at 10, 20, 30 and 45 days after transplanting was found effective against whitefly and leaf miner (0.96 larvae/ leaf). Similar results were obtained at Solan, where whitefly population was reduced from 0.31 flies/leaf to 0.22 flies / leaf with yield of 410 q/ha.

4. Chilli :

6. At Rahuri, alternate sprays of acephate 75 % WG @ 1g/L and dicofol 18.5 EC @ 2ml/L and neem oil at 0.1 % reduced the thrips (2.74/ leaf) and mites (14.73 / leaf) population and recorded with highest yield (157.82 q/ha).
7. At Hyderabad, three sprays of azadirachtin 10,000 ppm @ 5 ml/l at initiation of flowering and subsequent sprays at 15 days interval reduced midge damage by 33% and 20%, in flowers and fruits respectively. The next best treatments were thiacloprid 21.7 SL @ 0.6 ml/L, chlorantraniliprole 18.5 SC @ 0.3 ml/L in comparison to control.

5. Capsicum:

8. At Ludhiana, alternate sprays of acephate 75 SP @ 1 g/l and imidacloprid 17.8 SL @ 0.5 ml/l at 10 days interval found effective for the control of aphids (0.18-0.22/leaf) and thrips (0.14-0.22) as against control 1.09/leaf and 1.41/ leaf, respectively.

6. Bitter gourd:

9. Installation of cuelure baited traps @ 10 traps/acre and application of bait spray [jaggery solution (100 g jaggery + 900 ml water) + malathion @ 2 ml/l at 250 spots/ ha] at 15 days interval from flowering in bitter gourd crop could reduce the fruit fly damage to 18-20 % as compared to control

which recorded 47.7 % damage during kharif at Ludhiana and Solan.

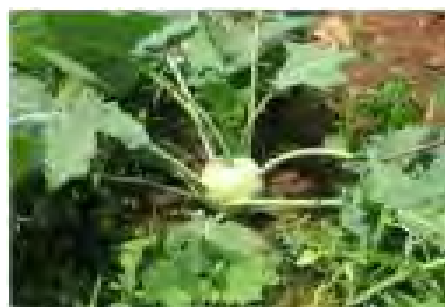
- At Rahuri, IPM module consisting of bait spray (Jaggery 10 % + malathion 2 ml/L) coupled with installation of cuelure traps suppressed fruit fly damage in bower system (16 %), Kniffin (21.65 %) and ground trailing (30.12 %) as compared to untreated plots with 22.44 %, 33.06 % and 44.2 % fruit fly damage, respectively.

7. Cowpea:

- At Anand, two sprays of flubendiamide 480 SC @ 0.3 ml/l or indoxacarb 14.5 SC @ 0.5 ml/l or emamectin benzoate 5 SG @ 0.5 g/l at 50% flowering and pod setting stage recorded lowest pod borer damage 9.45 %, 11.03 % and 13.41 % respectively as against control plots (26.57 %). Highest yield (125q/ha) was recorded in flubendamide treated plots.

Seed Production

- Based on two years data for IIHR on pelleting of seed, it is recommended that for obtaining bold, firm, oval to round and smooth pellets combination of vermicompost, cow dung and red soil powder in the ratio of 3:2:1 by volume along with 5% calcium peroxide and 5% ZnSO₄ and 1% Boric acid as filler material and combination of methyl cellulose (1.5%) and polyvinyl alcohol (3.0%) as adhesive may be used.
- Based on three years experimentation at Solan, it is recommended that azospirillum @ 5.0 kg/ha as root/steckling dip + recommended dose of NPK @ 150: 60: 54kg /ha should be applied at the time of field preparation for obtaining higher seed yield by better quality character of radish seed under mid hill conditions of HP. Similarly, based on two years data at Solan, it is recommended that spinosad (Tracer 45 SC) @ 2ppm (4.4 mg / kg seed) may be applied for the control of *Callosobruchus chinensis* in garden pea and *Callosobruchus maculatus* in French bean with improved seed germination under mid hill conditions of HP.
- Based on four years data at Solan, it is recommended to apply an application of poultry manure @ 3.5 t/ha + vermi-compost @ 3t/ha at the time of field preparation to obtain best results in terms of higher seed yield and other seed characters in indeterminate tomato under mid-hill conditions of HP.
- Based on three years data at Solan, it is recommended that Cucumber seed primed with disodium hydrogen phosphate @ 10⁻³ M for 24 hours may be used to get higher yield with more germination percentage, seedling length, seedling dry weight, seed vigour index - I and II under mid-hill conditions of HP.
- Based on four years data at Srinagar, it is recommended that by applying *Azospirillum* @ 5kg/ha+ recommended dose of N: P: K @ 120:60:60kg/ha, maximum seed yield (6.70 q/ha) can be obtained in knol - khol variety White Vienna.



Effect of *Azospirillum* on seed yield of knol-khol var. white Vienna

On the basis of three years studies, an application of *Azospirillum* @ 5 kg/ha alongwith the recommended dose of NPK (100:60:50 kg/ha) has been found effective for obtaining highest seed yield in brinjal cultivar Jawhar under Jabalpur conditions.

DISEASE MANAGEMENT

- IDM consisting of seed treatment with Carbendazim @ 1.5 g/kg and soil drenching with Carbendazim @ 0.1% three times at 15 days interval was effective in controlling *Fusarium* wilt (*F. oxysporum* f.sp. *melonis*) by 74.08% and the treatment recorded with high BC ratio (1:2.27) in muskmelon (cv. Keshar) at Rahuri.
- Foliar spray of Tridemorph 0.1% for three times at 10 days interval from the initiation of disease was suitable to control 81.8% of powdery mildew (*Podosphaera xanthi*) disease in bottle gourd (cv.CO1) and the treatment recorded high BC ratio (1:3.65) at Coimbatore.
- Foliar spray of Difenconazole 0.06% for three times at 10 days interval from the initiation of disease was effective to control 72.3% of anthracnose disease (*Colletotrichum capsici*) in chilli (cv. Bullet) and the treatment recorded with BC ratio (1:4.27) at Kalyani.
- IDM including, use of white nylon net (40-60 mesh) and soil application of neem cake @ 0.5kg/m² in nursery, border crop with two rows of maize and seedling dip of Imidacloprid 0.5ml/l for 60 min followed by four sprays at 10 days interval, first spray with Acephate @ 1.5 g/l + Neem oil 2 ml/l, second spray with Fipronil @ 1.5 g/lit + Neem oil 2 ml/l, third spray with Imidacloprid @ 2 g/ 15 l + Neem oil 2 ml/l and fourth spray with Acephate @ 1.5 g/l + Neem oil 2 ml/l under main field, recorded the highest reduction in *Tospo virus* incidence (76.5% and 68.3%) with the highest BC ratio 1:2.36 and 1:4.0 both in tomato cultivar (CO3) and hybrid (COH2) respectively at Coimbatore.

Breeder Seed Production and Price Review

- At the outset, the Chairman welcomed the dignitaries and participants in the session and emphasized the importance of seeds in general, and breeder seeds in particular, for enhancing the vegetable productivity. After his brief remarks, the Chairman asked Dr. T Chaubey to present the report of breeder seed production for the year 2011-12 and 2012-13. Since the rabi season was not yet over, most of the production programmes were in progress and the figures of breeder seeds produced were awaited. Some of the centres were unable to produce the indented quantity of some of the vegetables due to non availability of nucleus seed. Dr. D.P. Singh, Chairman of the session also made the remarks that breeder seed production of some old varieties is still in demand, which may be due to the presence of some special traits in these old varieties. The DDG asked the PC to ensure the breeder seed production as per the targets allotted to all the centres. The Co-chairman Dr A. T. Sadashiva asked the PC to submit the details of allocation of breeder seed to public and private institutes from next year onwards for proper monitoring.
- After the presentation of breeder seed production reports, the prices of breeder seeds revised in last group meeting held at Pantnagar (January 2012) were also presented in the house. The Chairman and Co-chairman stressed upon increase in the breeder seed rate keeping in mind increased cost of production. It was also discussed in the house that a committee may be formed to discuss the existing prices and to revise them, wherever necessary. However, house advised to increase the price of breeder seed of all vegetable crops by 25% in general and additional upto 25% for crop varieties having specific attributes like nutritional quality, resistance to biotic & abiotic stresses. Finally a committee of scientists from IIHR (Dr. Kashinath), IARI (Dr. Pritam Kalia) and PAU (Dr. MS Dhaliwal), Ludhiana was constituted for necessary suggestions in the price of the breeder seed of some varieties with special traits. The existing prices of breeder seeds of open pollinated varieties as revised by the committee in the XXXI Group Meeting held at CSKHPKV, Palampur are given in the following table:

A : Selling rate for general varieties

S. No.	Crop	Existing Rates (Rs/kg)	Revised Rates (Rs/kg)
1	Palak	200	250
2	Methi (Kasuri)	300	375
3	Okra	400	500
4	Tomato	1800	2250
5	Brinjal	1400	1750
6	Chilli	1200	1500
7	Capsicum/Paprika	6000	7500
8	Cowpea	400	500
9	French bean	300	380
10	Dolichos bean	300	380
11	Garden pea	200	250
12	Cauliflower (Early/Mid-early/Mid)	1500	1900
13	Late Cauliflower	3500	4375
14	Cabbage	1200	1500
15	Knol Kohl	1200	1500
16	Radish	500	625
17	Carrot	800	1000
18	Turnip	600	750
19	Onion	1000	1250
20	Bottle gourd	600	750
21	Bitter gourd	800	1000
22	Sponge gourd	600	750
23	Ridge gourd	600	750
24	Cucumber	1500	1900
25	Tinda (Round melon)	600	750
26	Pumpkin	800	1000
27	Muskmelon	800	1000
28	Watermelon	1500	1900
29	Coriander	300	375
30	Amaranthus	400	500
31	Long melon	700	875
32	Cumin	600	750
33	Fennel	200	250
34	Garlic	150	190
35	Fenugreek	200	250

B : Selling rate for premium varieties with specific attributes

S. No.	Crop	Varieties	Revised Rates (Rs/kg)
1	Carrot	Pusa Rudhira (IARI)	1200
2	Carrot	Pusa Vrishti (IARI)	1200
3	French bean	Arka Sharath (IIHR)	425
4	Garden pea	Arak Priya (IIHR)	300

Public Private Partnership

The chairman welcomed the delegates, after his brief opening remarks and invited the house for deliberation on effective public-private partnership on development of vegetable production technologies. He requested the representatives from the private sector to flag their problems in dealing with public

sector institutions. The Chairman emphasized that through exchange of germplasm of vegetables, public and private sectors may work together in vegetable research and support livelihood of farming community of the country. There is urgent need to establish a mutual understanding with each other for effective implementation of the vegetable research programme. The chairman thoroughly discussed the recommendations and action taken report of XXX Group Meeting held at Pantnagar.

He invited Dr. S.K. Tikoo (Co-Chairman) to present core issues and proposals on PPP. Dr. Tikoo presented several issues and proposals which were discussed thoroughly. In response of issues raised by Dr. Tikoo, DDG (Hort.) informed to the house that for cohesive relation with public and private, at Council level, some initiatives such as establishment of agro-innovative business company for commercialization of tissue culture plants in Oil palm has already been taken. He also informed that all the technologies developed in horticulture will be commercialized through IHR. In all ICAR Horticulture Institutes, there will be one representative from Pvt. Sector in their RAC meeting for finalisation of their research programmes.

Dr. Brahma Singh, the Chairman of the session has opined that all the varieties/hybrids developed by the public sector should be reflected in AICRP(VC) or IIVR web-site for sharing knowledge to the private sector.

Dr. N. K Krishna Kumar, DDG (Hort.) felt that there are number of biotic and abiotic stresses in vegetable crops, for which both private and public sector work together in consortium to ensure serious participation by Pvt Sector. In this regard, the DDG (Hort.) invited Dr. S.K. Tikoo to flag some national addressed problems in vegetable crops in which there can be collaboration between public and private research workers. After thorough discussion with public and private research workers, following problems have been identified to work in consortium mode.

- (1) Molecular markers development for key traits in Okra.
- (2) Breeding for Tospo virus in Tomato (Understanding the epidemiology of disease, identify the sources of resistance and molecular markers).
- (3) Breeding for insect resistance in hot pepper (mites, white flies and aphids and thrips).
- (4) Breeding for black rot resistance in Cauliflower.
- (5) Development of CMS system in Okra.
- (6) Breeding for heat tolerance in Tomato and Sweet/Hot pepper.

At the end of session, the Chairman suggested that besides seed production activities of vegetable crops, the private sector should also come forward in production of vegetable crops in protected condition particularly in construction & designing of poly houses, selection of varieties and managing of biotic stresses. He also emphasised that private sectors should also involve in strategies for reduction of the post-harvest losses, processing and marketing of vegetable crops, fertigation and micro-irrigation.

After thorough discussion, the following action points emerged to strengthen the public, private relationship in the vegetable research in the country.

- Supply of seeds of improved materials on non-exclusive basis has been agreed upon by both public and private partners.
- Uniform system of sharing of material in vegetable crops through single window of public sector.
- Private seed agency should also register their novel genotypes with NBPGR and share with public sector on mutually agreed terms.
- Public and private organizations should work hand in hand for quick and rapid dissemination of hybrids/varieties to the farmers.

- Public and private sectors should trust each other in collaborative programme.
- Testing fee should be deposited by private seed companies as per ICAR guidelines. In this context, Dr. C. S. Pathak, Nath Seed Company will pursue all the private seed companies for deposition of testing fee well in time.

The session ended with a vote of thanks to the chair.

Plenary Sessions

At the outset, the Chairman, Dr. N.K. Krishna Kumar, DDG (Horticulture) welcomed the delegates and called for session-wise presentations. The recommendations of germplasm-session were presented by Dr. K. K. Gangopadhyay from NBPGR, New Delhi. The Chairman stressed that NBPGR should approach to PI, NAGS center well in advance for common interest and coordinate the progress. He also pointed out that 10 major crops may be selected on priority and plan may be prepared in advance. He further suggested that Head, Vegetable Crops, IARI may take the responsibility of Katrain center to solve the inherent difficulties at the center. The Chairman opined that CARI may help in collection of elite germplasms. Dr. D.P. Singh was of the opinion that institution/organization utilizing the germplasm, should be reflected in the report. The Chairman also told that collection, evaluation, characterization and publication is the responsibility of the coordinator. He told that the wild species are the goldmine for future research, but none of the centers are reporting the collection of wild species. Thereafter, the report of IInd session (Vegetable Production) was presented by Dr. S.N.S. Chaurasia. In this session, the Chairman stressed upon the inclusion of crops, varieties, growing season, soil type, growing conditions (staking/ non staking), zones, doses of NPK and its time of application, amount and time/mode of application of organic manures/ biofertilizers, application of micronutrients etc. in the recommendations. Dr. Kirti Singh stressed that the treatments have been finalized after thorough discussions with a team of experts representing the entire country. Dr. S.K. Sharma suggested to invite senior people while formulating new programmes. This was agreed upon by the Chairman. The Chairman stressed upon the preparation of new programmes on nutrient packets as prepared by IIHR. The report on the hybrid trials was presented by Dr. A.T. Sadashiva. The report on varietal trials was presented by Dr. Pritam Kalia. The report on the resistant varietal trials was presented by Dr. S.K. Tikoo. The Chairman emphasized to use grafted seedlings to save the crops against biotic stresses. He also mentioned that vegetable soybean is coming up in a big way and it is the need of the hour to collect soybean germplasms from AVRDC, Taiwan and other resources and should be maintained at IIVR, IARI, NRC (Soybean), IIHR and TNAU. Dr. Sudhir Singh presented the report on physiology, biochemistry and processing. Dr. S.K. Malhotra suggested that since work is going on only at IIVR and PAU, Ludhiana, more centers should be included for basic, strategic and post-harvest processing of vegetables. The report on insect pest management was presented by Dr. A. B. Rai. The Chairman pointed out that collaborative programmes with AICRP (VC), AICRP (Pollinator) and AICRP (Pesticide residue) may be initiated. He also stressed upon to formulate good programmes for future research. The report on the seed production was presented by Dr. S.K. Sharma, Director CIAH, Bikaner. The Chairman desired that more experiments should be conducted on seed pelleting and coating. Dr. M Krishna Reddy presented the report of disease management. The Chairman desired that some new emerging diseases should be brought to the notice of the house. He further suggested the need of formulating crop based training programmes for master trainers. The report on breeder seed production and price fixation was presented by Dr. D.P. Singh. Dr. Brahma Singh presented the report of public private partnership. The report on general session was presented by Dr. S.K. Malhotra, ADG (Hort.). He stressed upon the preparation of crop calendar. He also suggested for timely submission of the reports to the co-ordinator. The co-ordinator should also ensure the timely supply of seeds to the centers.

The meeting ended with the remarks of the Chairman and vote of thanks by the Coordinator.