Table 2. Important characters of selections from crosses between resistant/tolerant sources and commercial varieties

S.No.	Crosses	Plant height (cm)	Plant canopy width (cm)	Colour of fruits	Fruit shape	Fruit number	Fruit length (cm) (g)	Average single fruit weight	Yield/ plant (g)
1.	*IR x Manjari	60.5	44.3	Deep Red	Long	49.8	6.7	1.8	101.0
2.	*LV2722 x KTPL 18	54.5	37.0	Red	Long	29.9	7.4	4.5	120.0
3.	*IR x Jwalamukhi	80.5	65.8	Deep Red	Long	33.2	10.5	2.8	104.5
4.	*Tumpang x Jwalamukhi	84.3	64.0	Red	Long	33.5	7.5	3.1	115.0
5.	*Tumpang x Manjari	46.5	25.0	Red	Long	46.6	7.5	1.9	107.0
6.	*IR x KTPL 18	75.5	51.0	Red	Long	37.0	13.5	4.6	175.7
7	IHR 384 x Jwalamukhi	60.0	34.1	Deep red	Long	21.1	9.7	5.2	120.9
8.	IHR 384 x KTPL 18	86.0	54.0	Deep red	Long	37.0	7.5	4.1	164.0
9.	IHR-517-1x Jwalamukhi	47.5	28.8	Deep Red	Long	27.3	7.6	3.7	109.8

*introduced sources

The important characters of the selections are presented in Table 2.

The selections from the crosses IR x KTPL 18 and IHR 384 x KTPL18 recorded high yields. All the selections had long fruits and red to deep red colour. Single fruit weight was lowest in IR x Manjari and Tumpang x Manjari.

Conclusion

Screening and evaluation studies showed that mosaic resistance could be successfully transferred to cultivated varieties from three exotic sources and two indigenous sources. The selections made are to be further evaluated for stability and improvement in yield characters.

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Performance of Exotic Collections of Cabbage in the North-western Mid-Hill Conditions of India

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Key Words: Cabbage, Evaluation, Germplasm

Cabbage (*Brassica oleracea* var. *capitata*) is an important vegetable having the largest area (0.28 m ha) and production (6.10 m ton) among the cole crops in India (Anonymous, 2002). Availability of germplasm with considerable amount of variability is a prerequisite for crop any improvement programme. It is also necessary to have information about the performance of the genetic materials in the environment where improvement work is to be undertaken. Therefore, the present investigation was aimed to collect germplasm of cabbage from the place of its origin or diversity and identify the promising collections under the mid hill conditions of India for their further utilization in breeding work.

Fifty germplasm of cabbage bearing EC No. 490156-490205 were obtained from the Horticulture Research International, Wellesbourne (UK) through NBPGR, New Delhi and put under evaluation during winter 2002-03 along with 5 others collected indigenously at the IARI, Regional Station, Katrain (32°N, 77°E, 1500 m above mean sea level). Plant-to-plant and row-to-row spacings were maintained at 45 cm each in a plot size of 3 m x 3 m. Each entry was replicated twice in a randomized complete block design and observations were recorded on 5 randomly selected plants for number of non-wrapper leaves, frame size, stalk length, head size index, gross plant weight and net head weight.

Data were analyzed statistically following Panse and Sukhatme (1985).

All the lines except EC-490188 could germinate and establish in the field. Five lines EC-490158, 490161, 490181, 490187 and 490205 bolted directly without forming heads and, therefore, data on head characteristics could not be recorded. EC-490159, 490166, 490168, 490171, 490178-490180, 490182, 490184, 490186, 490194, 490197, 490198 and 490203-490205 bolted directly without forming heads and, therefore, data on head characteristics could not be recorded. EC-490195 was found highly susceptible to black rot disease caused by *Xanthomonas campestris*. Sixteen lines viz., EC-490159, 490166, 490168, 490171, 490178-490180, 490182, 490184, 490186, 490194, 490197, 490198 and 490203-490205 were having the leaf and other characteristics of savoy cabbage types. EC-490198 and EC-490201 were obtained as F_1 hybrids.

It is pertinent from Table 1 that number of non-wrapper leaves were minimum in EC-490171 (13.0)

Table 1. Performance of exotic collections of cabbage for different characters

Hybrids	No. of non-wrapper leaves	Frame size (cm)	Stalk length (cm)	Head size index (cm^2)	Head shape	Gross plant weight (kg)	Net head weight (kg)
EC-490156	17.7	41.2	1.05	114.85	Round	0.68	0.38
EC-490157	17.0	36.5	0.70	78.30	Round	0.45	0.30
EC-490159	18.6	49.2	1.25	166.05	Round	1.48	0.69
EC-490160	16.9	37.5	1.10	134.00	Round	0.77	0.49
EC-490162	17.7	49.3	1.05	183.15	Round	1.60	0.893
EC-490163	17.7	42.0	0.70	139.10	Round	0.88	0.52
EC-490164	19.5	57.1	2.05	203.85	Round	2.02	0.58
EC-490165	17.7	39.5	1.20	119.20	Round	1.40	1.00
EC-490166	14.2	49.1	0.85	192.00	Oval	1.04	0.53
EC-490167	19.5	66.5	1.70	165.10	Oval	2.25	1.13
EC-490168	16.2	54.2	2.00	114.80	Oval	1.55	0.38
EC-490169	15.0	57.2	0.90	97.60	Flat	1.25	0.50
EC-490170	17.1	42.3	0.95	116.35	Round	0.64	0.37
EC-490171	13.0	52.2	0.65	175.70	Oval	1.07	0.49
EC-490172	15.3	37.5	1.25	116.65	Flat	0.77	0.45
EC-490173	15.8	41.0	1.20	181.90	Oval	0.92	0.68
EC-490174	19.5	45.7	1.50	134.20	Round	1.85	0.80
EC-490175	17.5	45.0	1.20	141.20	Flat	1.45	0.63
EC-490176	17.7	40.5	0.90	156.75	Round	0.94	0.94
EC-490177	15.1	43.2	1.20	114.80	Round	0.62	0.35
EC-490178	15.5	60.9	1.35	175.50	Oval	1.10	0.46
EC-490179	19.2	50.8	1.10	240.55	Round	1.80	1.04
EC-490180	14.5	53.5	2.00	235.50	Oval	1.85	1.20
EC-490182	14.2	52.5	1.75	220.85	Oval	1.45	0.67
EC-490183	14.1	43.8	0.80	226.50	Oval	1.28	0.83
EC-490184	21.0	54.0	1.55	172.70	Round	1.87	0.80
EC-490185	18.2	44.5	0.70	252.70	Round	1.48	1.02
EC-490186	17.6	55.2	1.70	306.45	Round	1.50	1.05
EC-490189	22.7	62.2	0.85	243.80	Round	2.77	1.00
EC-490190	17.0	36.2	1.05	111.80	Oval	0.61	0.39
EC-490191	18.0	40.8	1.30	187.40	Round	1.04	0.76
EC-490192	19.0	38.8	0.90	152.30	Round	0.82	0.63
EC-490193	16.7	44.0	0.60	156.80	Oval	1.05	0.78
EC-490194	13.3	42.0	2.10	146.75	Oval	0.91	0.48
EC-490195	14.4	42.4	0.75	184.20	Oval	0.98	0.65
EC-490196	17.2	42.4	0.55	176.90	Round	0.97	0.51
EC-490197	16.4	52.2	1.25	212.10	Oval	1.38	0.64
EC-490198	14.1	50.9	1.45	163.85	Oval	1.16	0.44
EC-490199	18.5	41.0	1.10	138.85	Round	0.93	0.63
EC-490200	16.0	43.1	0.80	158.65	Round	1.02	0.76
EC-490201	18.5	58.9	1.00	243.30	Oval	2.30	1.25
EC-490202	16.6	44.8	1.30	133.40	Round	0.94	0.52
EC-490203	15.6	48.0	1.45	173.85	Oval	1.15	0.51
EC-490204	18.1	53.7	1.75	295.60	Oval	2.25	1.20
EC-389796	18.4	41.4	0.75	144.75	Round	0.90	0.57
EC-389805	23.1	53.3	0.80	182.65	Flat	1.59	0.75
EC-389813-R	19.1	47.7	0.60	137.55	Round	1.17	0.67
EC-389813-F	23.5	49.9	1.35	168.05	Flat	1.48	0.58
Fieldman	19.2	49.0	1.15	160.10	Round	1.27	0.64
General Mean	17.3	47.5	1.16	170.22	–	1.25	0.66
SE±	0.82	3.82	0.11	8.58	–	0.16	0.12
CD at P=0.05	2.33	10.87	0.33	24.40	–	0.45	0.35

and maximum in EC-389813-F (23.5) whereas frame size ranged between 36.2 cm (EC-490190) to 66.5 cm (EC-490167). Minimum and maximum stalk length was recorded in EC-490196 (0.55 cm) and 490194 (2.10 cm), respectively. Maximum head size index of 306.45 cm^2 was recorded in EC-490186 and minimum of 78.30 cm^2 in EC-490157. Gross weight per plant ranged between 0.45 kg (EC-490157) to 2.77 kg (EC-490189). Maximum net head weight was recorded in EC-490201 (1.25 kg/head) and minimum in EC-490157 (0.30 kg/ head). It is, therefore, evident that considerable amount of variability was available for all the traits under study.

Based on the overall performance with respect to head shape (round), compactness of head, early heading, smaller frame size (<50 cm) and average net head weight (>0.75 kg/head), 7 lines viz., EC-490162, 490165, 490174, 490176, 490185, 490191 and 490200 were selected. Although EC-490201, 490204, 490180, 490167, 490186, 490179, 490183 and 490193 also had better net head weight but they had either oval head shape or resembled with savoy type of cabbage or both and therefore, not selected. Similarly EC-490189 and EC-389805 were also rejected due to their bigger frame size and flat head shape, respectively. The selected collections will be exploited in the on-going breeding programme on cabbage.

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Genetic Variability and Association Analysis in Exotic Cherry Tomato

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Key Words: Cherry Tomato, Genetic Divergence, Intertrait Correlation

Tomato is one of the most widely grown and commercially important vegetable crops. The numerous varieties differ greatly in plant form and fruit type, the latter ranging from a small currant size through cherry, plum, and pear forms to the large, nearly round fruits. Tomatoes are a valuable source of minerals and vitamins, particularly vitamins A and C. The cherry tomatoes are widely used in salads, with dip as an appetizer or as garnishing. In order to incorporate desirable characters to maximize marketable yield, the information on the nature and extent of genetic variability in a population of cherry tomato for desirable characters and inter trait relationship are the basic requirement. The material of the present study consisted of thirty two exotic genotypes of cherry tomato and evaluated in randomized complete block design at research farm of IIVR Varanasi during 2004.

The observations on nine morphological traits were analysed statistically. The variance analysis showed that the genotypes differed significantly among themselves for all the characters under study. The phenotypic coefficients of variation (PCV) were slightly higher than their corresponding genotypic coefficient of variation (GCV) due to environmental influence. The higher estimates of heritability coupled with the higher genetic advance for number of fruits per plant (98.9, 79.6) and plant height (98.8, 69.8) indicated that preponderance of additive effects and the direct selection would be rewarding for such traits. High heritability accompanied with low genetic advance for flesh thickness (99.2, 0.13) and number of locules (97.3, 1.2) is indicative of non-additive gene action.

Correlation studies showed that for most of the character pairs, genotypic and phenotypic associations were in the same direction and genotypic correlations estimates were higher than the phenotypic ones, indicating an inherited association between the characters. Yield per plant the most important economic trait, exhibited positive association with average fruit weight (0.53) and number of fruits per plant (0.38). The negative correlation was observed for number of fruits per plant with average fruit weight (-0.54), number of locules (-0.45) and flesh thickness (-0.34). Therefore simultaneous