Short Communication

HETEROSIS FOR TUBER YIELD AND ITS COMPONENTS IN SWEET POTATO (*IPOMOEA BATATAS* (L.) LAM.

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Abstract: In a line (6 x 4) study degree of heterosis varied from cross to cross for all the traits. The highest relative heterosis for tuber yield was observed in the progeny of IGSP-16 x Indira Madhur (39.45%). None of the progenies exhibited significant positive heterobeltiosis for tuber yield per plant whereas, fifteen progenies showed significant positive heterobeltiosis for number of tuber per plant. Heterosis was observed for number of tubers per plant and number of leaves per plant. While, low heterosis value were observed for tuber yield per plant, average weight of tubers, harvest index and number of veins per plant; moderate heterosis was observed for days to maturity , vein hight, fresh weight of top per plant and dry matter content. Overall, frequency of heterotic crosses was higher among the crosses involving parents with average gca effects.

Keywords: Heterosis, *Ipomoea batatas,* Tuber

INTRODUCTION

Sweet potato (*Ipomoea batatas* (L.) Lam.) locally known as Shakarkand belongs the family "Convolvulaceae" and is one of the most popular tuber crops in India and abroad because of its yield potential and high calorific value. Sweet potato is the world's seventh most important food crops other than wheat, rice, maize, barley, potato and cassava. It contains raw protein in fresh storage roots which ranges from 2.24 to 4.9 per cent on wet basis (Walter and Catignani,1981). The starch content in raw sweet potato storage roots varies from 33-73 per cent on dry basis (Truong *et al.*, 1986).

Heterosis breeding is here to stay as a potent genetic tool for exploiting the genetic divergence. Heterosis in F_1 generation is of much importance in cross pollination crops like sweet potato as heterotic crosses may give transgressive segregates for economic traits in the advanced generation. The phenomenon of heterosis which itself by greater vitality, rapid growth and development of F_1 has been extensively exploited in many cross pollinated crops. The heterotic response over mid as well as better parents could be in formative to identify true heterotic cross combination.

The knowledge of heterosis for economic traits can be effectively utilized in selective the desired traits in breeding programme. The relative heterosis and heterobeltiosis provide an idea about the role of dominance and over-dominance type of genetic control of the character.

MATERIAL AND METHOD

The experiment was conducted to randomized block design with three replication at Vegetable farm,All India Crop Research Project of Tuber, Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during rabi season 2009-10. The experimental materials was comprised of 6 lines,4 tester,24 F_1's and 1 standard check. F_1's were obtained by crossing in line x tester mating design. Analysis of variance was based on mean values (Panes and Sukhatme,1978) and heterosis over mid parent, better parent and standard check (Sree rethna) for each character was computed out as suggested by (Fonesca and Patterson,1968).

RESULT AND DISCUSSION

In the study, low magnitude of heterosis was observed for tuber yield per plant. Thesee finding were in agreement the result of Buso *et al.* (2003) and Luthra *et al.* (2001). Tuber yield per plant was the highest in the progeny of IGSP-C-16 x Indira Madhur (750 g) followed by Indira Naveen x IGSP-C-14 (725 g) and IGSP-C-16 x Indira-9 (700 g). The highest relative heterosis for this trait was registered by progeny of IGSP-C-16 x Indira-9 (35 %) followed by Indira naveen x IGSP-C-16 (28.35 %) and IGSP-17 x Indira-9 (22.36 %),while, the highest standard heterosis was observed in IGSP-16 x Indira madhur followed by Indira Naveen x Gauri (42.56 %) and IGSP-C-16 x Indira vardhini (41.34 %) out of 24 progenies, none exhibited significant positive heterobeltiosis for tuber yield per plant, whereas,11 progenies progenies exhibited significant positive heterobeltiosis for number of tubers per plant. Among 24 progenies, 5 progenies viz. F-6 x Indira madhur, E-5 x Gauri and F-6 x Indira-9 exhibited the highest significant positive heterosis over mid parent, better parent and standard check respectively, for number of tubers per plant.

In general,high heterosis was observed for number of tuber per plant and number of leaves per plant and moderate heterosis for days to maturity,vein height,fresh weight of tops per vein and dry matter percent per plant. While low heterosis was observed for tuber yield per plant,average weight of

tubers, harvest index and number of lobes per leaves. Only one progenies E-5 x Gauri showed significant positive heterosis over mid parent, better parent and standard check for average weight of tuber. The results indicated that negative heterotic effect in most of the progenies for tuber yield contributing attributing. These types of finding were earlier reported by Mishra *et al.* (2003) in potato. A comparison of the five best progenies showing heterobeltiosis for tuber yield were made with the heterotic response for other yield components (Table 1 and 2).

It showed that the positive heterobeltiosis for tuber yield resulted from number of lobes per leaves, total number of tubers per plant, average weight of tubers, harvest index and dry matter content.

Among all the yield attributes, total number of tubers per plant was observed to be the most important yield component, as had positive heterosis in most of the progenies.

Table 1. Comparative study of the five best heterotic crosses for tuber yield and other characters.

Best heterotic crosses	Tuber yield /plant (g)	Days maturity	Vein length (cm)	No of lobes/ leaves	Fresh weight of foliage of (g)
IGSP-C-16 x IM	22.45	2.47	-34.56	-4.25	8.00
IGSP-C-17 x Indira-9	14.95	10.36**	-8.62	-3.09	39.57**
IGSP-15xIndira Madhur	12.46	-1.09	-34.35**	-7.05	-6.95
Indira Naveen x Gauri	11.25	-6.67	-42.79**	-6.65	18.95
IGSP-C-14 x Gauri	9.08	2.36	-21.34**	-2.57	16.34

** indicates significant at P<- 0.05 and P<-0.01 levels,respectively.

Table 2. Comperative study of the five best heterotic crosses for yield characters

Best heterotic crosses	Total no of leaves/plant	No of tubers /plant	Average weight of tuber (g)	Harvest index (%)	Dry matter (%)
IGSP-C-16 x IM	59.95**	26.46*	0.95	2.34	-8.53
IGSP-C-17 x Indira-9	29.98	55.66**	-27.53*	-6.25*	-0.95
IGSP-15xIndira Madhur	-24.59	14.55	-14.72	4.00	-4.25
Indira Naveen x Gauri	-24.45	25.75*	-9.64	-4.45	-4.09
IGSP-C-14 x Gauri	78.46**	35.46**	-23.31	0.69	9.43*

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