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STUDIES ON INTERSPECIFIC HYBRIDS OF FIVE SPECIES OF *CAPSICUM* — WITH SPECIAL REFERENCE TO ITS QUALITATIVE AND QUANTITATIVE CHARACTERS*

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Chilli *(Capsicum* sp.) is a major spice crop that is grown extensively in the tropical and sub-tropical regions of the world. It is a source of vitamins A, B and C, capsaicin., carbohydrates and proteins Hybridization between cultivated crops and their wild relatives is a potential tool in improving the cultivated varieties by producing hybrids which serve as intermediaries in the transfer of desirable genes like disease resistance from wild relatives to cultivated species. It may also induce an additional vigour in the offsprings depending upon the type of recombination of genes.

Materials and Methods

In the present investigation, five species of *Capsicum viz., C. annuum, C. frutescens, C baccatum,* C. *microcarpum* and C. *pendulum* were used for intercrossing. C. *frutescens* is a prolific bearer, immune to TMV but has small sized fruits. C. *pendulum* has large fruits but is a poor bearer. C. *annuum* is a medium bearer with large fruits but susceptible to mosaic. Crosses were made in all combinations. Observations were recorded on various quantitative and qualitative characters.

Results and Discussion

Though crossing was done in all combinations fruit setting was noticed only in ten crosses and among these, seeds of CFxCA and CPxCA were not viable and in the cross CFxCP the seedlings failed to survive (Table 1). *C. annum* as the female parent failed to cross with any other species while as male parent there was seed setting in all the crosses except CBxCA. This may perhaps be due to a certain range of female sterility of C. *annuum* or to the longer style in *C.* annuum. In the crosses of *C. pendulum* X C. *annuum* and C. *frutescens* x C. *annuum* no viable seeds were obtained. This may be due to hybrid inviability resulting from defective endosperm and/or embryo. The phenomenon of post-fertilization failure has been observed by many workers

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Table 1

Results of crossing

Sl. No.	Female parent	Male parent	No. of. flowers crossed	No. of fruits obtained	Percentage of fruit set
1.	*C. annuum*	*C. pendulum*	80	0	0
2.	,,	*C baccatum*	28	0	0
3.	,,	*C. microcarpum*	31	0	0
4.	,,	*C. frutescenes*	58	0	0
5.	*C. baccatum*	*C. annuum*	22	0	0
6		*C. pendulum*	31	2	6.452
7.	,,	*C. microcarpum*	24	0	0
8.	,,	*C. frutescens*	18	0	0
9.	*C. frutescens*	*C. annuum*	21	1 (not viable)	4.762
10.	,,	*C pendulum*	38	5	13.158*
II	,,	*C. microcarpum*	28	9	32.143
12.	,,	*C, baccalum*	12	1	8.333
13.	*C. microcarpum*	*C. annuum*	16	9	56.250
14.	,,	*C, pendulum*	21	11	52.381
15.	,,	*C baccatum*	38	0	0
16.	,,	*C. frutescens*	11	5	45.455
17.	*C. pendulum*	*C. annuum*	46	1 (not viable)	2.174
IS.	,,	*C. baccatum*	14	0	0
19.	,,	*C. microcarpum*	41	3	7.317
20.	,,	*C. frutescens*	30	0	0

* The hybrid *C. frutescens* x C, *pendulum* eventhough produced viable seeds, the seedlings failed to survive

in various crosses. In the cross C. *frutescens X C. pendulum* eventhough viable seeds were obtained, the seedlings did not survive even the nursery stage. A similar result was reported by Krishnappa and Chennaveeriah (1965) in a cross between *Solatium aculeatissimum* and S. *khasianum.*

Quantitative characters

Heterosis was noticed in many of the quantitative characters and it varied with different parental combinations. This difference may be due to the different degrees of genetic diversity between parents. Characters which showed heterosis were height of plants, number of branches, number of leaves, spread of plants, duration of flowering, number of total fruits per plant and percentage ot fruit set. All the hybrids registered a conspicuous reduction in the number

of F_1 and F_2 seeds and germination capacity of F_1 and F_2 seeds. The maximum germination was observed in the cross CFxCB (73%) and the minimum in CM x CA (9%).

The hybrid CM x CF exhibited positive heterosis while its reciprocal hybrid exhibited negative heterosis with regard to plant height. This difference in reciprocal cross points to the possible role of cytoplasm in the transmission of character.

As regards the percentage of fruit set among the seven hybrids studied, 2 hybrids CM x CP and CFxCB out-yielded their respective parents, while the other hybrids registered a reduction (Table 2). CM x CP recorded the maximum percentage of fruit set (81.44) and CB x CP, the minimum (2.45). The increased fruit set may be attributed to heterosis while its decrease to the pollen sterility as well as megaspore sterility resulting from meiotic abnormalities. The crosses CFx CB recorded maximum number of fruits per plant (295) and CB x CP the minimum number (1). Regarding weight of fruits, among the parents *Capsicum pendulum* recorded maximum weight (248.7 gm) and the same was statistically superior to the rest of the parents (Table 3). The minimum fruit weight was recorded by CF (55.7 gm). The hybrid CP x CM had the maximum fruit weight (319.5 gm) and CB x CP the minimum (0.2 gm). As regards number of seeds per fruit CM x CP showed maximum number of seeds per fruit (53) and CF x CM and CM x CA hybrids had the minimum (2).

Qualitative characters

In the case of stem pigmentation, green stem with purple stripes was found to be completely dominant over green stem. Complete domi ance was also observed in leaf shape -- oval over triangular, petal colour — white with yellow tinged petals over white and pale petals, anther colour — light green over yellow and mature fruit colour — red over orange or yellow. Fruit shape indicated partial dominance with oval shape being intermediate between oblong and cylinderical fruit shapes. Erect position of fruit manifested no dominance over pendant position as reported by Ramanujam *et al.* (1965).

The most economic combinations among the seven hybrids studied were found to be CF x CB in which the increase in yield was 250 per cent and CP x CM in which the increase in weight of fruit was 54.5 per cent over their parental means.

Summary

Investigations on the inheritance of quantitative and qualitative characters and hetrosis among five species of *Capsicum* were carried out in the present study. Though crosses were made in all combinations, there was fruit

setting in only ten crosses. Of these 2 crosses produced no viable seeds and in another cross, the seedlings did not survive. C *annuum* as female parent failed to cross with any other species In the cross CF x CP, the embryo started normal development but collapsed in the early stage The F_1 hybrids exhibited heterosis for several economically desirable characters. All the hybrids showed a conspicuous reduction in the number and germination capacity of F_1 and I , seeds. Among the seven hybrids studied, the best economic combinations were *Capsicum frutescens* X C. *baccatum* and C. *pendulum* X C. *microcarpum*.

These results indicate the possiblity of selecting desirable types combining the economic attributes of both the parents from the segregating generations and by back crossing.

സംഗ്രഹം

കുരുമുളകിന്റെ അഞ്ച് വ്യത്യസ്ത സ്പീഷീസുകളുടെ പരിമാണാത്മകവും ഗുണാത്മകവുമായ സ്വഭാവങ്ങളുടെ പാരമ്പര്യഗതത്വവും സങ്കരവീര്യവും സംബന്ധിച്ച പഠനങ്ങൾ നടത്തി. എല്ലാ സങ്കലനങ്ങളിലും സങ്കരണം നടത്തിയെങ്കിലും പത്തു സങ്കരണങ്ങളിലേ കായ് പിടിത്തമുണ്ടായുള്ളൂ. ഇവയിൽ rasni സങ്കരണങ്ങളിൽനിന്നും കിട്ടിയ വിത്തുകൾ അങ്കുരണശേഷി ഇല്ലാത്തവയും മറ്റൊന്നിൽ നിന്നുണ്ടായ തൈകൾ പിടിച്ചുകിട്ടാത്തവയും ആയിരുന്നു. കാപ്സിക്കം ആന്വം മാതൃജനകം rara)5)CQ)5g^3)ta>06n§3g ഒരു സങ്കരണവും വിജയിച്ചില്ല. CFxCP സങ്കരണത്തിൽ F_1 ഗുണവികാസം ആരംഭിച്ചുവെങ്കിലും അവ പിന്നീട് നശിച്ചുപോയി. സങ്കരങ്ങൾ സാമ്പത്തിക പ്രാധാന്യമുള്ള പല സ്വഭാവങ്ങളിലും സങ്കരവീര്യം പ്രകടിപ്പിച്ചു. എന്നാൽ എല്ലാ സങ്കരങ്ങളും F_1 ഉം F_2 ഉം വിത്തുകളുടെ ഉൽപാദനത്തിലും അവയുടെ കിളിർക്കാനുള്ള ശേഷിയിലും കാര്യമായ കുറവ് പ്രകടിപ്പിച്ചു. പഠനവിധേയമാക്കിയ ഏഴ് സങ്കരങ്ങളിൽ ഏറ്റവും മെച്ചപ്പെട്ട സാമ്പത്തിക സ്വഭാവസങ്കലനം പ്രകടിപ്പിച്ചത് കാപ്സിക്കം ഫ്രൂട്ടെസൻസ് × കാ. ബക്കേറ്റവും കാ. പെൻഡുലം × കാ. മൈക്രോകാർപ്പവും ആയിരുന്നു.

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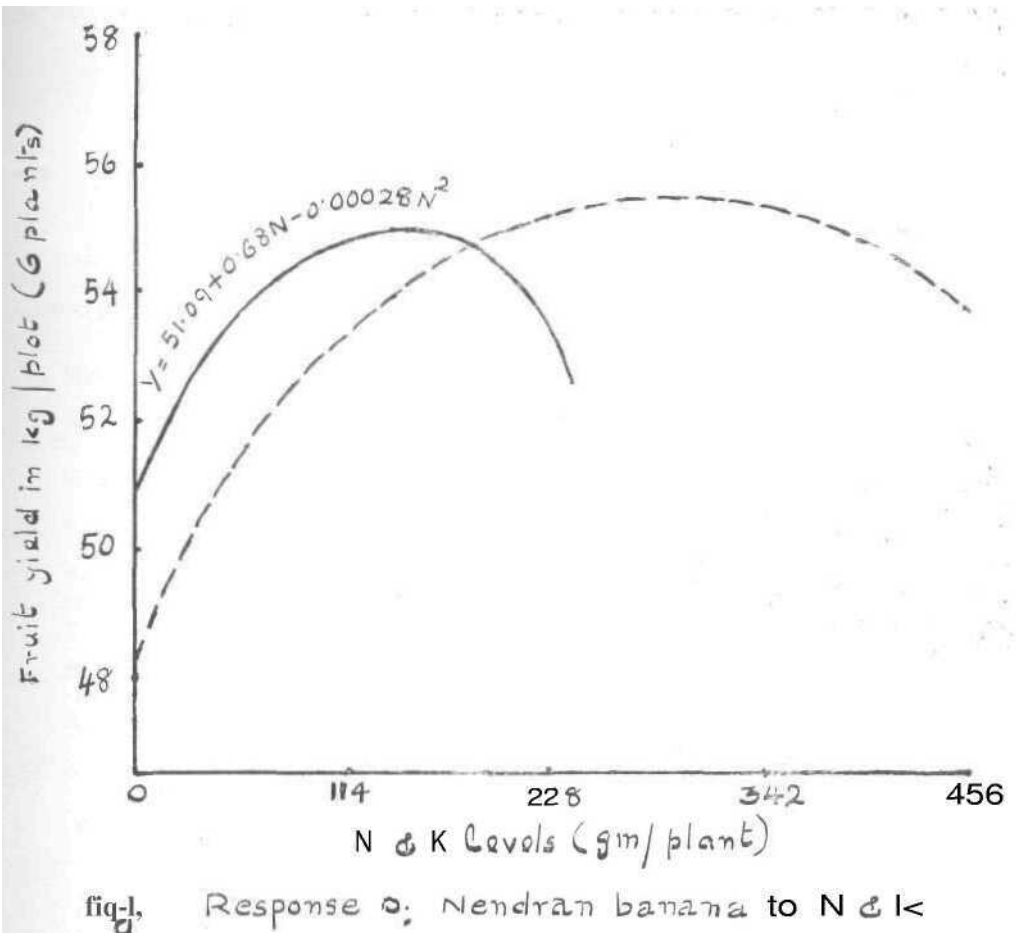

fig-1, Response of Nendran banana to N & K