

SUPPLEMENTARY POLLINATION STUDIES IN SUNFLOWER HYBRID SEED PRODUCTION

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ABSTRACT

Study on the influence of pollination methods on seed set and yield conducted at NSP, Bangalore, revealed that seed set in natural pollination is less (26.52% in summer and 30.70% in rabi) compared to supplementary hand pollination. Daily supplementary pollination recorded maximum seed set and seed yield in both the seasons (69.5% in summer and 81.4% in rabi) followed by alternate day pollination. Supplementary pollination with four days gap recorded lowest seed set. Seed set and yield were less in summer season compared to rabi in all the treatments.

INTRODUCTION

Sunflower (*Helianthus annuus* L.) is an important oil seed crop and it is grown in an area of 2.4 m.ha. with 1.8 m.tonnes of annual production in India. Development of sunflower hybrid for large scale cultivation has been made possible with the development of cytoplasmic male sterile and fertility restoring lines. Feasible and sound seed production technology is required for exploitation of hybrid vigour. The hybrid seed is produced generally by planting the parental lines alternating each other at a definite proportion. In this method whenever staggering sowing is required, differential planting of parental lines is a problemat-

ic one. Hence, nowadays in South India, planting male and female parents in separate blocks is in practices where honey bees contribution in cross pollination is very less (Jagadish et.al., 1995). However, supplementary hand pollination is being practiced in hybrid seed production. There is no much information regarding supplementary pollination studies in hybrid seed production. Considering these factors, field experiment was conducted during summer (February to May) and rabi (October to January) seasons at UAS, GKVK, Bangalore.

MATERIAL AND METHODS

Male (6D-1) and female (CMS 234A) parents of KBSH-1 were sown in 1:4 ratio with required staggering (male sown 8 days early). Field was inspected thoroughly for rogueing pollen shedders and off types. Natural pollination was allowed without any hand pollination (T 1). In other plots, supplementary hand pollination was carried out during morning hours (8-11 a.m.) from the day of commencement of flowering till the completion. Hand pollination was carried out everyday (T 2), alternate day (T 3), with two days gap (T 4) and with four days gap (T 5). Sufficient pollen was collected from male plants with the help of brush and smeared on stigma. These supplementary hand pollination treatments are in addition to natural pollination and the total number of pollinations in each treatment were different. Observations on seed set percentage, seed yield per plant and test weight were recorded.

RESULTS AND DISCUSSION

SUMMER (1994):

Significant differences in seed set and seed yield were observed between the treatments. Seed set in open pollination (natural) was less (26.52%) and daily hand pollination recorded maximum seed set and seed yield (65.5% and 19.5 g per plant respectively) pollination on alternate days also recorded better seed set (57.6%) followed by pollination with 2 days gap. Supplementary pollination with 4 days gap recorded lowest seed set (23.82%) and seed yield (7.05 g/plant).

RABI 1994:

The seed set and seed yield in general was better during rabi compared to summer season in all the treatments. Moderate temperature prevailing during rabi season favours good seed set and high temperature during summer resulted in poor seed set. Maximum seed set was recorded in daily hand pollination (81.4%) followed by alternate day pollination (75.3%) and were statistically on par. Seed set by natural pollination was less (30.7%) compared to hand pollination treatments.

There was no significant differences in 100-seed weight (test weight) between treatments in both the seasons. However natural pollination recorded more test weight compared to hand pollination treatments. Supplementary hand pollination in general resulted in reduced test weight of the seeds. The reduction in test weight may be due to an increase in seed set by hand polli-

nation. When the sink is increased by hand pollination, the photosynthates would have distributed equally resulting in lower test weight (Sathyanarayana, 1979). Low seed set due to natural pollination is due to less honey bee visit to male sterile female flowers compared to male parents, because of availability of both nector and pollen in male flower and only nector in female parent. Thus it appear that efficient media for pollen movement is very much essential to get high seed yield. The seed set and seed yield were found to be significantly higher when hand pollination was carried out compared to natural pollination. Among hand pollination, daily and alternate days pollination recorded higher seed yield. Similar findings have been reported by Choulwar et.al. (1989), and Sudhir (1995). The higher yields in the above said treatments may be the resultant of pollination being done frequently thereby newly emerged, highly receptive stigma are being pollinated. It was also observed that in male sterile line (CMS 234A), a minimum of two whorls open per day and stigma receptivity was high for 2-3 days. Such results have been reported by Kempegowda (1992) and Sudhir (1995). Further, when pollination was carried out at four days interval, some of the whorls opened earlier had lesser or no stigma receptivity resulting in lower seed set and seed yield.

REFERENCES

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Table 1: Pollination studies in hybrid sunflower seed production during Summer 1994

Treatments	Seed set (%)	Seed yield per plant (g)	Seed Yield per plot (g/15 m)	100 seed weight (g)
T1- Open pollination	26.52	7.37	423.50	7.35
T2- H P - daily	65.50	19.55	925.50	6.95
T3- H P - alternate day	57.55	16.95	810.00	6.95
T4- H P at 2 days gap	44.70	12.92	550.00	6.67
T5- H P at 4 days gap	23.82	7.05	401.00	6.65
Mean	42.81	17.76	622.20	6.95
F.Test	*	**	*	NS
S.Em.+	2.06	1.61	4.922	0.169
C.D(5%)	6.35	3.57	151.70	0.522

Table 2: Pollination studies in hybrid sunflower seed production during Rabi 1994.

Treatment	Seed set (%)	Seed yield per plant (g)	Seed yield per plot (g/15 m)	100 seed weight (g)
T1-Open pollination	30.70	19.70	852	5.86
T2- H P- daily	81.40	40.60	1762	5.18
T3- H P- alternate day	75.30	35.80	1465	5.38
T4- H P at 2 days gap	69.30	32.50	1241	5.48
T5- H P at 4 days gap	66.20	30.80	1065	5.56
Mean	64.60	31.90	1279	5.48
F.Test	*	*	*	NS
S.Em.+	2.10	2.29	63.80	0.15
C.D(5%)	6.69	7.08	196.70	0.45

H.P - Hand Pollination