EFFECT OF DIFFERENT MODES OF POLLINATION IN SUNFLOWER *HELIANTHUS ANNUS* L. (COMPOSITAE) SOWN ON DIFFERENT DATES BY *TRIGONA IRIDIPENNIS* SMITH

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The role of honeybees in cross pollination of important agro horticultural crops is well recognised. Sunflower *(Helianthus annus* L.) being an important oilseed crop has been recently introduced in India. It occupies an area of over 300,000 ha. The problem of poor seed setting and filling is an important constraint in its productivity, besides many other reasons (Seetharam, 1981).

It was therefore decided to investigate and to evaluate the potential of so called "stingless" bees, *Trigona iridipennis* S. by keeping its colony inside the sunflower field.

Materials and Methods

The colonies of *Trigona iridipennis* S. were utilized to study the effect of bee pollination on the increase in yield of sunflower. For this purpose, there were three treatments viz. Open-pollination, Bee pollination and Self-pollination.

Modern variety of sunflower crop was sown on four different dates; 4.9.1985, 5.10.1985, 7.11.1985 and 10.12.1985. The spacing between rows was 60 cm. The effect of bee species was studied in similar manner in all the four cases.

In open-pollination (OP) a sot of 30 plants was marked in the area of 2 x 1.8 m in the centre of each replication.

In the treatment, self-pollination (SP), 30 plants were enclosed in a cage of 2 x 1.8 m size, made of plastic kept free from insects and bees.

In case of bee-pollination (BP), a colony of *Trigona* bee was kept inside the cage for a period of 20 days just at the initiation of flowering to cover the entire flowering period.

Split plot desing of experiment was followed with 3 replications. The yield data of 30 plants in each treatment was recorded for each replication. The increase in yield due to bee pollination over self-pollination was calculated. In addition, the yield (g) of 30 plants, number of seeds/flower head and percentage of filled seeds/ flower head were also recorded in all the above three treatments.

Results and Discussion

The results of the experiment are given in the following tables.

Table 1

Effect of different modes of pollination on the yield (g)/30 plants

Date of sowing	Yield (g)/30 flower heads			Average
	OP	BP	SP	
04.09.85	826.10	602.60	352.63	593.77
05.10.85	888.27	628.06	360.16	625.50
07.11.85	982.00	677.60	346.50	668.70
10.12.85	868.26	623.03	349.50	613.61
Average	891.15	632.82	352.20	—

Table 2

Effect of different modes of pollination on number of seeds/flower head

Date of sowing	Number of seeds/flower head			Average
	OP	BP	SP	
04.09.85	683.13	539.80	426.53	549.82
05.10.85	711.83	547.93	441.86	561.21
07.11.85	785.10	608.26	452.83	615.40
10.12.85	710.20	544.43	429.46	561.36
Average	722.56	560.10	437.67	—

Table 3

Effect of different modes of pollination on the percentage of filled seeds/flower head

Date of sowing	% of filled seeds/flower head			Average
	OP	BP	SP	
04.09.85	77.71	69.62	61.62	69.65
05.10.85	80.99	72.07	62.48	78.84
07.11.85	82.30	73.01	63.45	72.92
10.12.85	80.36	70.42	62.21	71.00
Average	80.34	71.28	62.44	—

In this experiment 3 different modes of pollination (OP, BP and SP) were screened at different dates of sowing in terms of yield and few other ancillary characters in split plot design. Dates of sowing were kept as main treatments and modes of pollination as sub-treatments.

Highest average yield of 668.70 g/30 flower heads was obtained in the crop sown on 7.11.1985 which was also significantly superior to others. The average yield (g/30 flower heads) obtained on 3 other dates of sowing was 625.50,613,61 and 593.77 g. The dates of sowing were statistically significant amongst themselves.

The number of seeds/flower was found to be statistically significant in the treatment OP (722.56) followed by in the treatment BP and SP in which the number of seeds/flo-

wer head obtained was 560.10 and 437.67 respectively.

Regarding the modes of pollination, open pollination was found to be the best and statistically significant over bee-pollination and self-pollination, giving the average yield of 891.15 g/30 flower heads. This was followed by BP (632.82 g) and SP (352.20 g). The treatment of BP was also found to be statistically superior over self-pollination.

Percentage of filled seeds was also found to be statistically significant in OP followed by BP and SP. BP and SP were also statistically significant among themselves.

The interaction between dates of sowing and modes of pollination was also found significant in respect of third date of sowing (7.11.85) with maximum yield of 982.00 g in OP. This was followed by D-2 (5.10.85) and D-4 (10.12.85) both in the treatment OP. These were statistically significant among themselves.

From the results of this experiment, it can be concluded that there was significantly higher yield in open-pollination in the sunflower crop sown on 7.11.85 (D-3).

Goyal and Atwal (1973) found that the yield in sunflower can be even doubled by providing enough number of bees. But this increase in yield seems possible only by using *Apis indica* or *Apis mellifera.* Practically no work has so far been done by using stingless bee, *Trigona iridipennis* S. In fields all the species of honey bee viz. *A. mellifera, A. indica, A. florea, A. dorsata* and *Trigona* constitute 99.5% of the day time insect visitors, thus bringing qualitative improvement in sunflower seeds (Radford *et al.* 1979). According to Wakhle *et al.* (1978) oil content is also increased in the seeds on which honeybee species have worked.

The results obtained under present investigations reveal that higher yields in sunflower are obtained in OP treatments are supported by the findings of Radford and Rhodes (1980). It has been concluded in their studies that 59.1% seed-set was obtained under the treatment of open-pollination.

In the present studies the yield as high as 891.15 g/30 flower heads was obtained in OP treatment, while the plants caged with *Trigona* bee colony gave the yield of 632.82 g.

It is felt that there is a need of more work to evaluate the pollination potential of this smallest honeybee, *Trigona iridipennis* Smith.

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