

## QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

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**HONEY BEE (APIS MELLIFERA L.) ACTIVITY ON  
SUNFLOWERS (HELIANTHUS ANNUUS L.)**

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**SUMMARY**

The numbers of honey bees appearing on sunflowers were studied at half hourly intervals during the flowering of a crop together with the availability of nectar and pollen during the same period.

Nectar was the major attractant being available to honey bees throughout the day. Pollen was present in abundance for a period during the morning and to a lesser extent in the afternoon. Pollen was collected passively by worker bees foraging for nectar.

Passive distribution of pollen both within and between sunflower heads by nectar-seeking honey bees would increase fertilization of sunflower varieties displaying self-incompatibility.

**I. INTRODUCTION**

Sunflower seed production is an expanding industry in Queensland (Australian Bureau of Statistics 1975). Studies by Free (1970) Palmer-Jones and Forster (1975) and Radford (unpublished data) have shown that exclusion of insect pollinators from sunflower heads results in reduced seed set. Placing apiaries adjacent to fields of sunflowers was found to significantly increase yield in Canada (Furgala 1954) while Russian workers showed that in large sunflower fields seed production decreased with increase in distance from honey bee colonies (Free 1970).

A pilot programme using a systems analysis approach to study the agronomic, economic and land use aspects of sunflowers growing on the Darling Downs, was commenced in 1973. As part of this study a number of projects was designed to investigate sunflower pollination. This project was carried out to gain an understanding of honey bee behaviour on the sunflower crop, the information being required for the design and interpretation of remaining projects. The work was carried out at Allora in January 1975.

## II. MATERIALS AND METHODS

A 21-ha paddock of oilseed sunflowers was selected at a time when most heads had commenced to flower. A 100-m strip of sunflowers comprising 198 flowering heads was randomly selected and marked off along the eastern boundary of the crop. At 30-min intervals between 5.30 a.m. and 6 p.m. on two consecutive days honey bees present on the sunflower heads in the strip were counted and their behaviour noted.

An apiary comprising 14 colonies was placed along the western boundary of the crop at the commencement of flowering. The number of bees leaving one hive over a period of 5 min was recorded by means of a cone technique (Gary 1967) immediately after counts of bees on the crop had been taken.

Pollen availability was assessed at each count by observing the presence of pollen at anther tubes of open disc florets. The criterion for maximum pollen availability was the readily observed abundance of pollen on the anther tubes. Nectar availability was assessed at each count by the presence of nectar collecting honey bee foragers on flower heads.

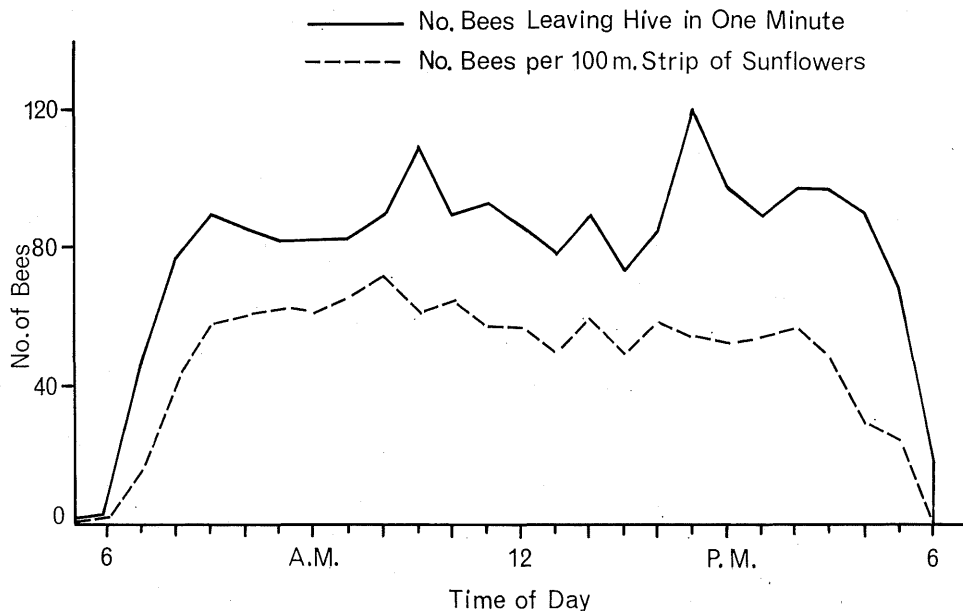


Figure 1. The number of honey bees leaving a hive in one minute and the number of honey bees present on 198 sunflower heads in a 100-m strip. Allora, January 1975.

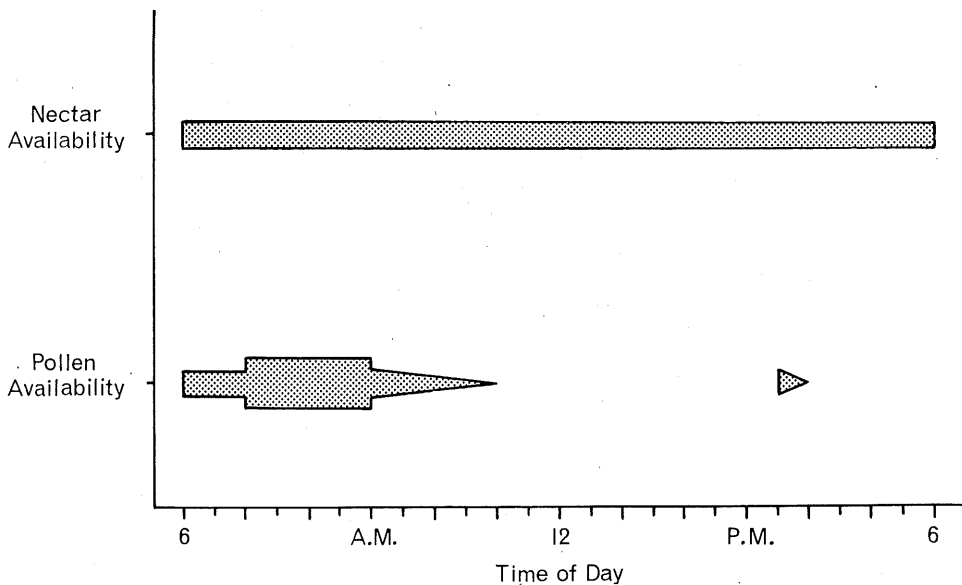


Figure 2. Availability of nectar and pollen to honey bees. Maximum release of pollen at anther tubes occurred between 7 and 9 a.m.

### III. RESULTS AND DISCUSSION

The number of honey bees leaving a hive in 1 min and the number of honey bees present on sunflower heads in the 100-m strip are shown in figure 1. Flying from the hive and within the crop covered the period from dawn (5.30 a.m.) to dusk (6 p.m.). The fluctuations for the two curves were similar throughout the period of activity.

Availability of nectar and pollen to honey bees is shown in figure 2. Nectar was available to honey bees throughout the day. Pollen was present on sunflower heads between 6 and 11 a.m. and 3.30 and 4 p.m. with maximum pollen being noted on heads between 7 and 9 a.m.

Of a total of 2 465 bees observed during the project only one bee (0.04%) was observed to be actively collecting and packing sunflower pollen.

Nectar was available to honey bees throughout the day and was the major attractant of honey bees to the sunflower crop.

Maximum availability of pollen at the flower head occurred between 7 a.m. and 9 a.m. This coincided with the major collection of pollen by honey bees. The abundance of pollen present at the peak period resulted in worker bees which were foraging for nectar becoming dusted with pollen grains as they moved about the flower head. Pollen collected in this passive manner was then actively transferred to the corbicula and taken to the hive where it was stored.

Sunflower pollen was accepted readily in the hive and was utilised for breed production. As most cultivars are self-incompatible (McGregor 1976) transfer of pollen between flower heads should result in increased seed set.

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