

Matthew J. Allan & Robin R. Dean (2022) An integrated system for field studies on honey bees, *Journal of Apicultural Research*, DOI: [10.1080/00218839.2021.2018107](https://doi.org/10.1080/00218839.2021.2018107)

### Stakeholder Summary

Research on honey bees may be carried out in a laboratory where the bees are constrained, or outdoors, where the bees can fly from and back to their hives. Outdoor studies are classified either as 'semi-field', where bee flight is restricted in a cage or tunnel, or 'field', where bees have unrestricted flight. A key challenge in a semi-field study is ensuring that the food (nectar and pollen) available within the cage is sufficient to sustain the colony, whereas in a field study the challenge is to understand and evaluate the forage available to the colony. In both field and semi-field studies, improved and simplified techniques of observation and recording of impacts are desirable. The use of small colonies in miniature hives is commonplace. However, there is a lack of specialised equipment; bee hives designed for commercial beekeepers may not be effective for research. For example, commercial pollen traps designed to collect kilograms of pollen are disruptive and cumbersome, when only a few grams of pollen are required. We propose an integrated system of research equipment which enables the creation and management of small viable honeybee colonies (say 3,000 adults). Each part of the system is designed and built in a coordinated fashion to improve speed, ease, reliability and accuracy.

The system is built around the Study Frame, shown below, which fits the German Mini Plus hive (a small well-insulated hive primarily used for queen rearing). The Study Frame has many features, the key ones being queen excluder covers (to cage the queen on the frame) and the use of plastic foundation (to prevent queens escaping through holes in the comb). By noting the date and time of caging and releasing a queen, the age of her brood can be accurately determined. The system also uses the Converter Hive which accommodates Study Frames as well as large commercial frames in populous colonies. This facilitates the creation of small, equalised colonies by permitting the wide selection of comb, stores, brood and adults. Other features of the system include a mobile photographic apparatus for studying impacts on brood; and a combined floor, stand, varroa tray, dead bee trap and miniature pollen trap. The pollen trap is particularly useful in collecting small amounts of pollen for analysis of agrochemical residues, and measuring the pollen collection rate of colonies, as an indicator of colony activity.



Fig. PoshBee Study Frame