

Taping insect pollinators for quality seed production in onion

Quality seed production in onion is mainly driven by insect pollinators and their foraging visits. Amount of forage visitation, time of visitation, type of visit and visiting insects determine quantity of pollination and efficiency. Under natural condition, bees are the major pollinating agents in onion. However, use of chemical pesticides against onion thrips, *Thrips tabaci*, less diversity in and around the area of field and man-made factor like urbanization could have negative impacts on insect pollinating service. Therefore, it is critical to adopt sustainable way of approach to retain and conserve the existing insect pollinators and their diversity in onion ecosystem.

ONION, an important vegetable of Indian, is grown mainly in *rabi* as well as in *kharif*. Globally, India rank first in area (10.64 lakh ha) of cultivation and second in production (151.18 mt). Average productivity (14.21 t/ha) is much lesser than global average (19.47 t/ha). One of few reasons for low productivity is lack of availability of quality seed to the farmers. Total requirement of onion seed in a season is an average of 800 tonnes. Of which only 8-9% seed is produced by organised sectors, while remaining 80% is produced by farmers on their own.

Onion is highly cross-pollinated crop and flowers are protandrous, self pollination is largely absent. Phenomenon of cross-pollination in onion is mainly depending upon insects forage visits. With the absence of insect pollinators, few seed set is possible. Further, while in hybrid seed production, pollinator services are bit more essential than that of varietal seed production as the pollen transfer need to taken between the umbels. Hence, role of ecosystem services is critical factor for proper seed set for quality onion seed production.

Under natural conditions, onion umbels are visited by number of insect species. As like that of other

flowering plants, onion blossoms are highly attractive to both pollen and nectar collecting insects and are good source of minerals and sugars. However, attractiveness could differ with types of ecosystem, which can be modified by plant characters, environmental and topographic factors.

ENHANCING POLLINATORS VISITS IN ONION

Judicious Use of Insecticides

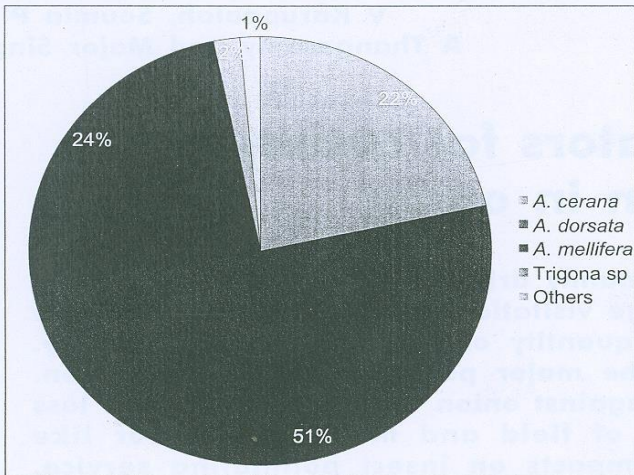
Use of synthetic insecticides in onion is indispensable as they were essential component in Onion thrips, *Thrips tabaci*, IPM. Thrips is a key pest of bulb as well in seed onion throughout the stages and *insect vector* of deadly onion disease, Irish Yellow Spot Virus.

Manipulation of Neighbouring Crops and Planting Bee Attractive Crops

The neighbouring crops around the onion seed crop should be non attractive to bees. Generally grains and tomatoes are advised. Flowering weeds within the onion crops as well as surrounding areas are to removed since they are attractive to the bees. To invite timely bee visitation and enhance their visitation rate, planting

Insect Foragers in Onion Ecosystem

Onion umbels are more attractive to various species of insect pollinators. The important forage visitors that visit for floral rewards of onion are Little bee (*Apis florea* Fab), Indian bee (*Apis cerana* Fab), Rock bee (*Apis dorsata* Fab), Western bee (*Apis mellifera*), Stingless bee (*Trigona* sp), Carpenter bee (*Xylocopa* sp), Yellow banded wasp (*Vespa orientalis* L.), Sulphur butterfly, *Pieris rapae* L, Danais butterfly (*Danais chrysippus* (L)), Syrphid, *Eristalis* sp and House fly (*Musca domestica* L.). Among various insect foragers, honeybees are major foraging insect species in onion. The trend of number of foragers visits at DOGR, Pune was studied and grouped as Rock bee, *Apis dorsata* > *A. mellifera* > *A. cerana* > *Trigona* spp. Generally, insect forage visits in onion overlap with the flower opening time. Regardless of the bee species visiting in onion, peak forage visits occurs mostly during noon hours 12.30 PM-1.30 PM. The synchrony between the flower opening and insect forage visit is essential to achieve appropriate pollination. Prevalence of asynchrony also could possible, especially at the time of peak blooming when less pollinator activity prolongs. The climatic factors in and around of crop canopy and field may influence the forage visits.

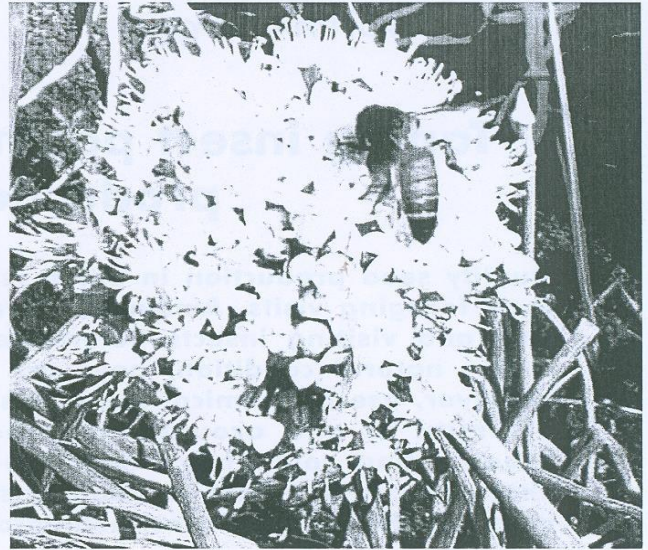


Abundance of insect pollinators in onion

of bee attractant crops like mustard, fennel, coriander in and around of onion field is suggested. Planting mustard as border/intercrop after two weeks of onion budding attract bees and facilitates more bees visits. This approach attract and diverts insect foragers in time and could increase upto 0.60-fold higher visitation than sole onion planted. However, these attractant crops should be cut down/ harvested and no more stand of trap crop is permitted when the umbel initiation is started in seed onion. Balanced fertilizer application and maintaining good irrigation management are required to sustain adequate nectar production in onion. Too wet and dry fields would results into low amount of nectar production, which is not desirable for bees visit. Irrigating field at 10-12 days intervals would be optimum in onion seed crop to maintain sound visitation rate.

Supplementing Bee Hives for Enhanced Pollination

It is an important practice required to achieve good pollination rate. For open-pollinated varieties, systemically placing bee hives of *Apis mellifera* or *Apis cerana* @ 4-6 hives/acre would enhance bees activity and pollination success rate satisfactorily. Hives are to be placed when 10% flowers are opened. Hybrid seed production fields may require higher number of hives (10 to 12/acre). Stingless bee *Trigona* spp can also be supplemented but it requires more number of hives (almost double) as compared to *Apis* species



Rock bee foraging in onion umbel

colonies. Hives are to be placed in and around the field, provided proper shade at the top. Always good

to keep hives entrance directed towards field interior to ensures the bees working within onion field rather than foraging elsewhere.

Hives colony with good strength, free of diseases and mites is advised. Frequent inspection of colony is required to ensure the health of bee hives. Spraying of commercial formulation of bee attracting agent like Bee-Q (15 g/lit) and 5% sugar syrup or 10% molasses is also advised to manipulate and increase bees visitation in onion seed production system.

SUMMARY

The role of insect pollinators activity in onion cross-pollination is essential for onion seed production. The loss of insect pollinators and their diversity due to man-made activity is irreparable. The integrated bee management strategies would be effective and efficient in minimizing casualty of pollinators without any further ecological implications.

For further interaction, please write to:

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