

Insect Pollinators and their Management in Onion

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SUMMARY

Quality seeds are the basis for maximizing the onion productivity and profitability. However, owing to the floral morphology, protandrous mechanism and pollination process of onion, production of quality seed remains a challenge when compared to other vegetable crops. The event of pollination entirely depends on insect activity at the time of flowering. Therefore, to achieve effective pollination, it is crucial to ensure that good number of pollinating insects' visitation for maximum seed set. Onion umbels invites number of insect species and their blossoms are highly attractive to both pollen and nectar collecting insects. However, very often, umbels fail to set optimum seed, mainly because of lack of insect pollinators and their visits. Under natural condition, there are factors such as external environment, landscape of location, varietal traits like floral rewards, cultivation practices and use of synthetic pesticides makes adverse impacts on insect species visits and their diversity, foraging behavior and pollination efficiency. Therefore, it is vital to have sound knowledge on these aspects to tap the potential of ecosystem services including managed pollinators and native pollinator species. In this article we have detailed the list of important insect pollinators associated with onion and their management options for better onion seed production.

INTRODUCTION

The umbels of onion are more attractive to various species of insect pollinators. Among various insect foragers, honeybees are a key foraging insect species in onion. Onion umbels invites number of insect species and their blossoms are highly attractive to both pollen and nectar collecting insects. Floral rewards of onion are good source of minerals and sugars. 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, *Syrphid* sp and House fly *Musca domestica* L.

Onion Pollination

The process of flowering and anthesis in onion is continuous process and usually it takes more than a month. Moreover, time of seed set of some plant also vary with the tillers as the umbels are formed in different time. This permits longer duration to insects for their visits and foraging. However, very often, umbels fail to set optimum seed, mainly because of lack of insect pollinators and their visits. Under natural condition, there are factors such as external environment, landscape of location, varietal traits like floral rewards, cultivation practices and use of synthetic pesticides makes adverse impacts on insect species visits and their diversity, foraging behavior and pollination efficiency. Usually, insect forage visits in onion is 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 to 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 is prolonged.



Fig 1. Onion seed production field

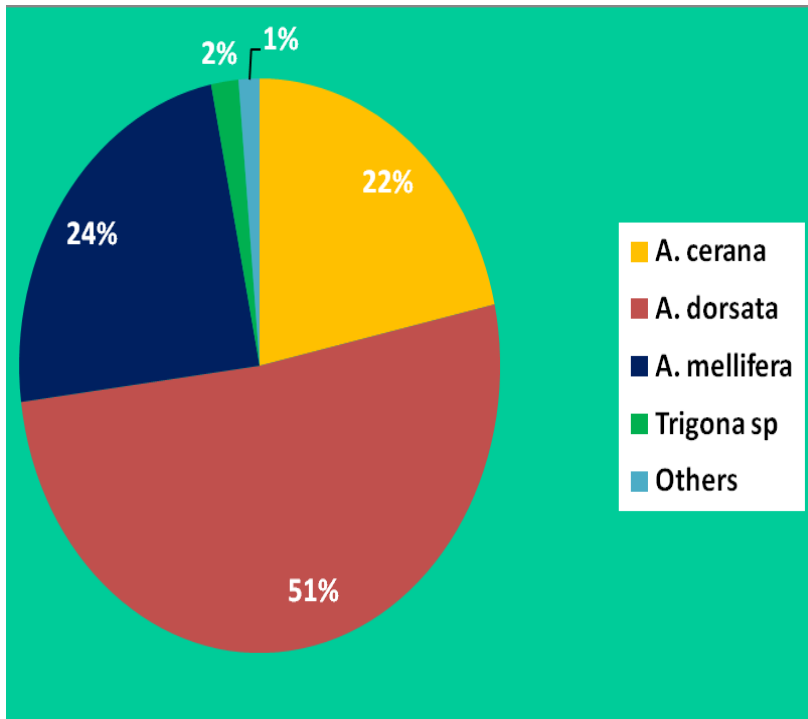


Fig 2. Abundance of insect pollinators in onion



Fig 3. Rock bee foraging in onion umbel

Pollinators Management

- As, bees are the primary pollinators of onions, maintaining bee health is critical to retain the pollinators abundance and good pollination. Therefore, spray schedule for onion thrips control should be followed as window strategies. Application of insecticides such as profenophos (@ 1 ml/lit), fibronil (@ 1 ml/lit), carbosulfan (@ 2 ml/lit) should be done with extreme caution until umbel initiation, and not after flower opening.
- Spray in the late evening is advised since the foragers activity is low or nil, so that early exposure of bees to this poisonous chemicals can be avoided.
- The adjacent crops around the onion seed crop should be non attractive to bees. Generally grains and tomatoes are advised. Planting bee attractant crops like mustard, fennel, coriander in and around the onion field is recommended to invite timely bee visitation and increase their visitation rate. After two weeks of onion dibbling, planting mustard as border/intercrop would be optimum, and facilitates more bees visits. However, these attractant crops should be cut down/ harvested when the umbel initiation is started in seed onion.
- To maintain appropriate nectar production in onions, balanced fertilizer application and good irrigation management are essential. Fields that are too wet and dry fields will produce less nectar, which is undesirable for bees visit. Irrigating the field every 10-12 days intervals would be ideal in an onion seed crop to maintain sound visitation rate.
- Bee hives placement is an important practice for achieving a high pollination rate. For open-pollinated varieties, systemically placing *Apis mellifera* or *Apis cerana* @ 4-6 hives/acre would significantly increase bees activity and pollination success rate. Hives are to be placed in and around the field, with adequate shade at the top. Always good to keep hives entrance directed towards field interior to ensure 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 are also advised to manipulate and increase bees visitation in onion seed production system.

CONCLUSION

Insect pollinator particularly *Apis* and non-*Apis* bee species and their foraging visits is essential for onion pollination. Amount of forage visitation, time of visitation, type of visit and visiting insects determine quantity of pollination and efficiency. Bees are the major pollinating agents in onion. However, chemical pesticides used against onion thrips, *Thrips tabaci*, a lack of pollinator diversity and man-made factor like urbanization could have negative impact. Therefore, it is critical to adopt sustainable way of approach to retaining and conserving the existing insect pollinators and their diversity in onion ecosystem.

REFERENCES

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