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Factors affecting pollinators and pollination

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Abstract

A number of factors are responsible for the pollinators and the pollination process. “In addition to honey bees, now it is known that bumble bees and other pollinators are also declining perhaps due to combined effects of pesticide use and destruction by human” (D.L. Cox *et al.*, 2007; Cameron *et al.*, 2011; Kluser and Peduzzi, 2007). A number of factors are responsible for the declining status of pollinators namely: climate changes, stress from pathogens, invasive species etc. “The density dependent and independent factors determine different life history traits of insects like geographical distribution, relative abundance, growth rate, overwintering, interspecific competition, number of generations” (Savopoulou-Soultani *et al.*, 2012) and “population dynamics” (Shivanna *et al.*, 2011). “The foraging and defensive behavior of honeybees is strongly affected by certain density independent factors i.e., temperature, wind speed, light, rainfall and humidity”.

Keywords: Factors affecting pollinators, pollination, population dynamics

1. Introduction

1.1 Plant pollinator relationship

It is a fact that pollinators not only enhance the reproduction but also the “genetic diversity of around 80% of the plant species”. More than plant species are self-incompatible or are completely dependent on biotic pollination. “Cross pollination does not only lead to seed production for approximately half of species of plant but result is also seen in high production of seed and progeny performance in many self-incompatible species”. “A relationship between diversity of pollinators and seed production can also be established for the plants with generalist pollinator system” (Albrecht *et al.* 2012) ^[1]. “Animal pollinators are thought to contribute 15-30% of global food production” (McGregor 1976; Roubik 1995) ^[9, 14] and “bees are recognized to be the most important pollinating taxon” (Delaplane & Mayer 2000) ^[6]. “Farmers also get adequate pollination services by bringing large numbers of honey bees to crop fields” (Greenleaf & Kremen 2006) ^[7].

1.2 Trends and scenario of pollinators and pollinator dependent plants in all ecosystems

“A very positive relationship between floral abundance and diversity of flower visiting animals at the habitat scale is now very well established” (Potts *et al.*, 2003) ^[22]. “The most convincing evidence for an effect of floral resources on pollinator populations comes from the demographic studies which show that colony growth and reproduction in bees can reflect the availability of floral resources”. “Sunflower pollen is sticky and heavy so it cannot be carried by wind” (Yadav *et al.*, 2002) ^[20]. “That is the reason why pollen is transferred from male lines to female by pollinators or insects”. Earlier studies also suggested that more seed is set when honey bees forage on sunflowers (Parker, 1981; Paiva *et al.*, 2002) ^[10, 11].

2. Pollination Studies

In a study it was found that “the open pollinated plants the number of capsules per 10 panicle was significantly higher as compared to the plants without insect pollination” (3700%, 570 in OP & 15 in WIP). The number of seeds/10 panicle in OP was also more than the WIP. The number of seeds per capsule too was significantly higher in OP compared to WIP (11.6 in OP; 7.2 in WIP). These studies demonstrate some degrees of self-pollination in Malabar cultivar of cardamoms in WIP, the panicles were enclosed in the bags with no visits of the insects. It can be concluded that the increase in number of capsules and seeds could be due to pollination by the bees. There are also so many results supporting the same (Chandran *et al.*, 1983) ^[4]. “Insect species belonging to the order Hymenoptera are affected by a number of abiotic factors such as rainfall, humidity, temperature, wind velocity and light radiation”

(Southwick and Moritz, 1987) ^[19]. For example, in case of bees and wasps, the most important abiotic factor is ambient air temperature (Heinrich, 1984) ^[8]. Some previous studies confirm the significantly higher visitation rate of *A. dorsata* as compared to *A. florea* in *B. napus* (Ali *et al.*, 2011) ^[3], onion (Sajjad *et al.*, 2008) ^[23] and pumpkin (Ali *et al.*, 2016) ^[2]. Contrary to this, Zameer *et al.* (2017) ^[21] found “significantly lower visitation rate of *A. dorsata* than *A. florea* in radish whereas Saeed *et al.* (2012) ^[16] did not find any significant difference between visitation rates of two honeybees in bitter gourd”.

3. Conclusion

It can be easily concluded that the pollination by honey bee species plays an important role in the flowering as well as yield of crop. The visit frequencies were also different in all other species of honey bees. Abiotic factors such as temperature, RH, etc. are also responsible for the foraging behaviour of different apis species.

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