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Studies on effect of insect pollinators on seed quality parameters of pigeonpea

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Abstract

The experiment were carried out under field conditions during season *Kharif*, 2014-15 at Farm of Main Experiment Station and seed entomology lab of Acharya Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Ayodhya (U.P.). During the course of investigation “Studies on effect of insect pollinators on seed quality parameters”. The maximum seed germination 91 per cent was recorded in treatment Open-pollination which was significantly higher than Bee-pollination with 88 per cent. The lowest seed germination 83 per cent was recorded in Self-pollination. The maximum seed vigour index 1674 was recorded in treatment Open-pollination which was significantly higher as compared to seed vigour index 1365 in Bee- pollination and the lowest seed vigour index 1121 was observed in s treatment Self-pollination.

Keywords: Pigeonpea, honey bees, *Kharif*, pollination, vigour index & seed quality

Introduction

Pigeonpea [*Cajanus cajan* (L.) Millsp], is a short-lived perennial crop of family Fabaceae and it is invariably cultivated as annual and often cross-pollinated (20-70%) crop. Pigeonpea is one of the major grain legume crops grown in the tropics and subtropics (Saxena *et al.*, 2002) [6]. Pollination is an essential prerequisite for major reproductive crop yield and perennation of higher plant species. It has been customary to associate pollination and plant productivity with the production of seed. Off course plant productivity should include only the production of seed and fruits but the production of nectar, pollen and honey as well. The bees visit the one flower to another flower, providing chances to the stigma for selection of pollen to pollinate the flower during the course. This opportunity is neither provided by hand pollination nor the other methods of pollination, which is the basic and initial unit of plant breeding, enhancement of quality seed production, plant productivity, genetic improvement and genetic biodiversity in nature (Singh, 1996) [8]. Visitation by wild insects and honey bees promoted seed set independently, so pollination by managed honey bees supplemented, rather than substituted for pollination by wild insects. Our results suggest that new practices for integrated management of both honey bees and diversity of wild insect assemblages will enhance global crop yields. Predominantly pigeonpea flowers are self-fertilized with 20-40% cross-fertilization so it is known as often cross-pollinated crop. *Cajanus cajan* flowers have bright corollae and produce nectar and pollen. These traits suggest that *C. cajan* would be attractive and possibly be pollinated by bees (Grewal *et al.*, 1990; Saxena *et al.*, 1990; Reddy *et al.*, 2004 and Sarah *et al.*, 2010) [2, 7, 4, 5]. Globally, yields of insect-pollinated crops are often managed for greater pollination through the addition of honey bees (*Apis mellifera* L.) as an agricultural input. Therefore, the potential impact of wild pollinator decline on crop yields is largely unknown. Nor is it known whether increasing application of honey bees compensates for losses of wild pollinators.

Materials and methods

1. Experiment site

The field works of experiment was carried out at farm of Main Experiment Station and laboratory work was carried out in seed entomology laboratory of Achary Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhay (U.P.) on the Ayodhay- Rai Bareilly road at a distance of 42 km from Ayodhay district head quarter, Narendra Nagar (Kumarganj).

2. Assessment of seed quality

To assess the seed quality following observations were recorded in seed entomology lab:

A. Seed germination per cent

Seed of pigeonpea kept in moistured towel papers and this towel papers kept in seed germinator for seven days then recorded germination, length of root and shoot of seedlings.

B. Seed vigour index

Total length of seedling (Length of Root + Length of Shoot) × Germination per cent.

Results and Discussion

Insect-pollinators' effect on seed quality parameters

Seed germination per cent

The significant effect of insect pollinators on the seed germination of pigeonpea was recorded. The maximum seed germination 91 per cent was recorded in Open-pollination which was significantly highest followed by Bee-pollination was 88 per cent. The lowest seed germination 83 per cent was found in self-pollination. Rashmi *et al.* (2010) [3] studied the effect of different modes of pollination in seed production of pigeonpea revealed that the maximum germination per cent was recorded in open-pollination, followed by *A. florea*, *A. cerana* and *T. iridipennis* pollination. Anonymous (2014-15) also found maximum seed germination per cent in open-pollinated crop followed by bee-pollination and self-pollination.

Seed Vigour Index

The significant effect of insect pollinators on the seed vigour index of pigeonpea crop was recorded and presented in Table. The maximum seed vigour index 1674 was recorded in treatment T₂ (Open-pollination) as compared to seed vigour index 1365 in treatment T₃ (Bee-pollination) and the lowest seed vigour index 1121 was observed in treatment T₁ (Self-pollination). Anonymous (2014-15) [1] also found maximum seed vigour index in open-pollination followed by bee-pollination and self-pollination.

Table 1: Effect of insect pollination on seed germination and seed vigour index of pigeonpea

Treatment	Germination per cent	Vigour index
Self-Pollination (SP)	83	1121
Open-Pollination (OP)	92	1674
Bee-Pollination (BP)	88	1365
CV %	1.24	2.125
CD at 5% level	1.341	36.254

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