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EFFECT OF DIFFERENT MODES OF POLLINATION ON SEED YIELD OF CORIANDER IN SOUTH-EASTERN RAJASTHAN

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ABSTRACT

Studies were conducted during *rabi* 2011-12 and 2012-13 at ARS, Kota on coriander crop to determine the effect of pollinators in quantitative yield parameters. Coriander variety "CS-6" was grown following all recommended agronomic practices. The plots were kept unsprayed throughout the crop season. The colonies of honeybee (*Apis mellifera*) were placed in hives before the initiation of flowering. The present study contained three pollination treatments viz., Plants caged Pollinator exclusion (PE), Plants caged with bee hive (BP) and Plants kept open to all pollinators (OP). The comperative data pertaining to modes of pollination in coriander crop revealed that difference in mean seeds per plant, per cent seed set, and seed yield (Q/ha) were statistically significant. The highest values of mean seed/ plant (288.35), seed set (77.25%) and seed yield (13.58 q/ha) were obtained from open pollinated followed by bee pollinated and it was recorded lowest in pollinator exclude.

Key word: Honeybee, Coriander, Pollination treatments, Quantitative yield parameters

INTRODUCTION

Cross pollination of entomophilous crops by honeybees is considered as one of the effective and cheapest method for triggering the crop yield both qualitatively and quantitatively. The pollination service provider bees contribute handsomely in enhancing the productivity and production of cross as well as self pollinated crops through efficient pollination (Mohapatra *et.al*., 2010). Coriander (*Coriandrum sativum* Linn.) is an important seed spice crop, cultivated for its seed as well as tender leaves, which are used as common food flavoring agents throughout the country. About 80 per cent of the world total coriander seed is produced in our country of which more than 80 per cent is produced in South-East Rajasthan (Sharma and Singh, 2013). Honeybees are the most efficient and abundant amongst insect pollinators of crops (Singh *et. al*., 2005); and are the only pollinators that can be hived in bee-boxes and moved from place to place, installed in the field for pollination as and when required. The present study aims to assess the role of honeybees in coriander.

MATERIAL AND METHODS

Field investigations were carried out during *rabi* 2011-12 and 2012-13 at the Agricultural Research Station, Ummedganj, Kota. Coriander variety "CS-6" was sown during the second to third week of November in gross plots of 10x10 sq. feet following all the recommended agronomic practices. The plots were kept unsprayed throughout the crop season. There were three treatments, *viz.,* plants caged pollinator exclusion (PE), plants caged with bee hive (BP) and plants kept open to all pollinators (OP). In the treatment of bee pollination, a bee colony with *Apis mellifera* was used and kept till completion of flowering. For this purpose special bee hive boxes with back and front entrance was kept open in one boundary of cage to facilitate the bees to move in and out of the cage. Fine nylon mosquito net cages of size 10x10x12 cubic feet were erected on standing crop before the initiation of flowering. Iron pipes were used for making the cage to hold the nylon net in position. Lower edges of the mosquito net were touched to the ground so as to exclude hovering insects. Each treatment was replicated eight times in a randomized block design. The observations included number of seeds per plant, quantum of seed set (%) and seed yield for each plot under each treatment.

RESULT AND DISCUSSION

There were significant differences for all the quantitative parameters investigated among the different pollination methods. In pooled data highest values were obtained from open pollination, followed by plants caged with *A. mellifera* hives and plants caged without access to any pollinators (PE). The pooled data (Table-1) showed maximum (288.35) numbers of seeds per plant in plots that had free access to all the pollinators (OP), followed by that in bee pollinated (BP) being 240.00

Table 1. Yield parameters as affected by pollination treatments in coriander

Pollination Treatments	Yield attributing characters					
	No. of seed /plant			Seed set (%)		
	2011-12	2012-13	Pooled Mean	2011-12	2012-13	Pooled Mean
Pollinator exclusion (PE)	148.00	150.57	149.28	61.50	63.31	62.40
Bee pollination (BP)	246.86	240.00	243.43	68.21	69.57	68.89
Open pollination (OP)	298.00	278.71	288.35	78.00	76.50	77.25
S. Em. ()	3.356	8.79	4.72	3.19	1.13	1.17
C.D. (5%)	10.34	27.02	14.82	9.82	3.48	5.32

*All observations are mean of eight replications.

Table 2. Impact of pollination on coriander yield

Pollination Treatments	Yield (Q/ha)			
	2011-12	2012-13	Pooled Mean	Increase/decrease (%)
Pollinator exclusion (PE)	5.81	6.83	6.32	-
Bee pollination (BP)	10.29	11.37	10.83	(+) 71.36
Open pollination (OP)	13.33	13.83	13.58	(+) 114.87
S. Em. ()	0.13	0.37	0.20	-
C.D. (5%)	0.42	1.14	0.62	-

*All observations are mean of eight replications.

seeds per plant. The lowest (149.28) number of seeds /plant were recorded from plants excluded from pollinators (PE). Ahmed and Rehman (2002) observed in mustard that the number of siliquae per plant was significantly higher in OP (189.60-190.24) over PWI (120.93-120.69). Thapa (2006) observed 11 per cent increase in pod setting in Indian mustard dus to insect pollination.

The pooled data in terms of seed set percentage (Table 1) of the two years revealed that maximum 77.25 per cent was in OP followed by that in BP (68.89%). The lowest (62.40 %) was recorded in PE. Verma and Joshi (1983) reported that on mustard bloom, honeybee pollination increased the number of seeds by 4.07 per pod. Delbrassinne and Rasmont (1988) reported that intensive pollination of *Brassica juncea* Linnaeus by *A. mellifera* increased the number of seeds per pod (12.22%), Panda *et al* (1989) recorded the average seed number/ pod to be 10.80 when pollinated by insects; whereas, without insects it was 5.90. Ahmed and Rehman (2002) found that the number of seeds per siliqua was 12.04-12.60 per cent higher than PWI in the two varieties of rapeseed. Sanwas *et al* (2014) found that *A. mellifera* increased the number of seed per pod (23.27%) in mustard under Konkan conditions of Maharashtra.

Similarly, pooled data of seed yield (Q/ha) in Table-2 showed maximum 13.58 q/ha in OP followed by 10.83 q/ha in BP. The lowest seed yield of 6.83 q/ha was recorded from PE. The data of OP and BP showed about 114.87 and 71.36 percent increased seed yield over PE, respectively. Prasad *et al* (1989) reported that open pollination gave the maximum yield (13.4 q/ha) followed by plots caged with one *A. cerana* honeybee colony (11.3 q/ha) in *B. juncea*; whereas, plots caged without bees (exclusion of pollinators) gave the lowest seed yield (10 q/ha). Chand and Singh (1995) also reported that mustard plots caged without any pollinator had lowest seed yield (966 kg/ha); whereas, free access to all the pollinators showed the maximum yield (1620 kg/ha) followed by plots caged with honeybees (1160 kg/ha). Sanwas *et al* (2014) reported maximum seed yield (963.45 Kg/ha) of mustard under free access to all pollinators; while, the lowest yield (602.52 Kg/ha) was recorded when no insects were provided access; however, plots pollinated by honeybees (*A. cerana indica* Fab.) gave moderate yield (763.75 Kg/ha).

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REFERENCES

Ahmed, B. and Rehman, A. 2002. Population dynamics of insect foragers and their effect on yield of rapeseed (*Brassica campestris* L. var. *toria*). *Indian Bee Journal*, **64**: 1-5.

Chand, H. and Singh, B. 1995. Effect of pollination by *Apis cerana* F. on yield of mustard, *Brassica juncea* L. *Indian Bee Journal*, **57**: 173-174.

Delbrassinne, S. and Rasmont, P. 1988. Cotribution to the study of pollination of rape, *Brassica napus* var. *oleiera* in Belgium. Bull des *Recherches Agronomi ques de Gem bloux*. **23**: 123-152.

Mohapatra, L.N. Sontakke, B.K. and Ranasingh, N. 2010. Enhancement of crop production through bee pollination. Orissa review, September, 2010. pp 44-47.

Panda, P. Nanda,U.K., Mohapatra, H. and Padhi, J. 1989. Insect pollination in some oil seed crops in Orissa. *Indian Bee Journal*, ***51***: 97-98.

Prasad, D. Hameed, S.F., Singh, R., Yazdani, S.S. and Singh, B. 1989. Effect of bee pollination on the quantity and quality of rai crop (*Brassica juncea* Coss.). *Indian Bee Journal*, **51**: 45-47.

Sharma, R.D. and Singh R.S. 2013. Present and future Prospectus for coriander seed production in South-East Rajasthan. Report of September, 2013 of NBSS & LUP, Regional Centre, Udaipur (Raj.).

Sanas, A.P., Narangalkar, A.L., Godase, S.K. and Dalvi, V.V. 2014. Effect of honeybee pollination on quantitative yield parameters of mustard (*B. juncea*) under Konkan condition of Maharastra. Green Farming, **5**: 241-243.

Singh, R., Chaudhary, B.K., Bhowmick and Singh, R.P. 2005. Honeybee flora of Bihar, Uttar Pradesh and Madhya Pradesh. *International Beekeeping Congress*, Nov. 13^{th} –18^{th} 2005, Bangalore, India. pp.53.

Thapa, R.B. 2006. Honeybees and other insect pollinators of cultivated plants: A review. *Journal of Institute of Agriculture and Animal Sciences,* **27**: 1-23.

Verma, S.K. and Joshi, N.K. 1983. Studies on honeybees in the pollination of cauliflower (*Brassica olercea* L. var. *Botryitis*). *Indian Bee Journal*, **45**: 45-55.