COMPARATIVE STUDY OF CROSS POLLINATION ON ONION BY APIS MELIFERA AND APIS INDICA

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Abstract: Investigations to identify the pollinator community of insects and its role in onion (Allium cepa L.) pollination were carried out at the research farm. The community of pollinators was composed of two bees (Order: Hymenoptera) Among bees, *Apis melifera* proved to be an abundant pollinator (2.85±1.57 individuals/25 plants). All the insect pollinator species reached peak activity during 10:00 to 12:00 h. *Apis melimera* exhibited the most efficient foraging behavior by visiting 17.14±1.38 flowers in 147.5±8.14 seconds on an umbel. A. melifera was revealed as the most effective pollinator, however, based on seed setting results for visits by single species over 20 minutes and which produced 506 seeds/umbel/20 minute visit.

Introduction: Onion (*Allium cepa* L) is an important vegetable crop and is a major ingredient of cooked food. It can be used in salads, as raw and as a condiment. It is estimated that about 55 million tons of onion are produced annually all over the world (www.fao.org). Insect pollination is necessary for many cross pollinated crops especially in case of hybrid seed production e.g. onion

Materials And Methods: This study was conducted at Kotamgaon , Neur and Vikharni in Yeola Tahsil(distance between three villages are 10 Km) , during Dec.-April 2013. The plot size of one rood (1/4acre) for each treatment with row to row distance of 75 cm and plant to plant distance of 30 cm was maintained and sowing was done. There was poor sprouting of bulbs in some rows which were filled in by transplanting bulbs from non experimental area for uniform population. Agronomic practices like hoeing, weeding, application of fertilizer (NPK) and farm yard manure were applied equally in all the treatments. Seed stems started developing (bolting) in third week of February, while flowering commenced by second week of March 2013. Treatments applied were plants in plots with honeybees.The first plot with *Apis melifera* , second with *Apis indica* and third one as control without honey bees.

Observation: The table no. 4.1 shows the data of 25 umbels are studied for find out the percentage of onion cross pollination by bees. From this data out of 100 the maximum seed count in the control plot is 69, in the plot *Apis indica* is 89 while in the plot *Apis melifera* is 100. The minimum count in the plot control is 58 in the plot *Apis indica* is 78 while in the plot *Apis melifera* is 94.

Statistically we says that the natural seed setting (control)in onion is 63.5 ± 5.5, where we apply the bees like *Apis indica* the seed setting rate is 83.5 ± 5.5 and the species Apis mellifera then the seed setting rate is 97 ± 3 .The average count is in the control plot is64.12% in the plot *Apis indica* is 84.16 while in the plot *Apis melifera* is 98.04.

Table No7.1 : Onion Cross Pollination By Bees

Out of Hundred No. of Onion Seed sets in per umbels

Sr. No. of Umbel	Control	*Apis indica*	*Apis melifera*
1	62	86	100
2	67	81	96
3	64	78	98
4	60	79	97
5	58	87	96
6	63	85	99
7	61	83	98
8	67	81	100
9	63	79	100
10	65	82	99
11	59	87	95
12	65	84	94
13	69	85	99

14	68	86	100
15	67	79	100
16	61	89	100
17	63	83	98
18	65	86	99
19	67	87	97
20	68	84	95
21	59	83	97
22	64	88	98
23	67	89	100
24	62	86	99
25	69	87	98
Total	1603	2104	2452
Percentage	64.12	84.16	98.04
Maximum	69	89	100
Minimum	58	78	94

Chart No. 7 .1.: Comparative Study of Onion Cross Pollination by bees.

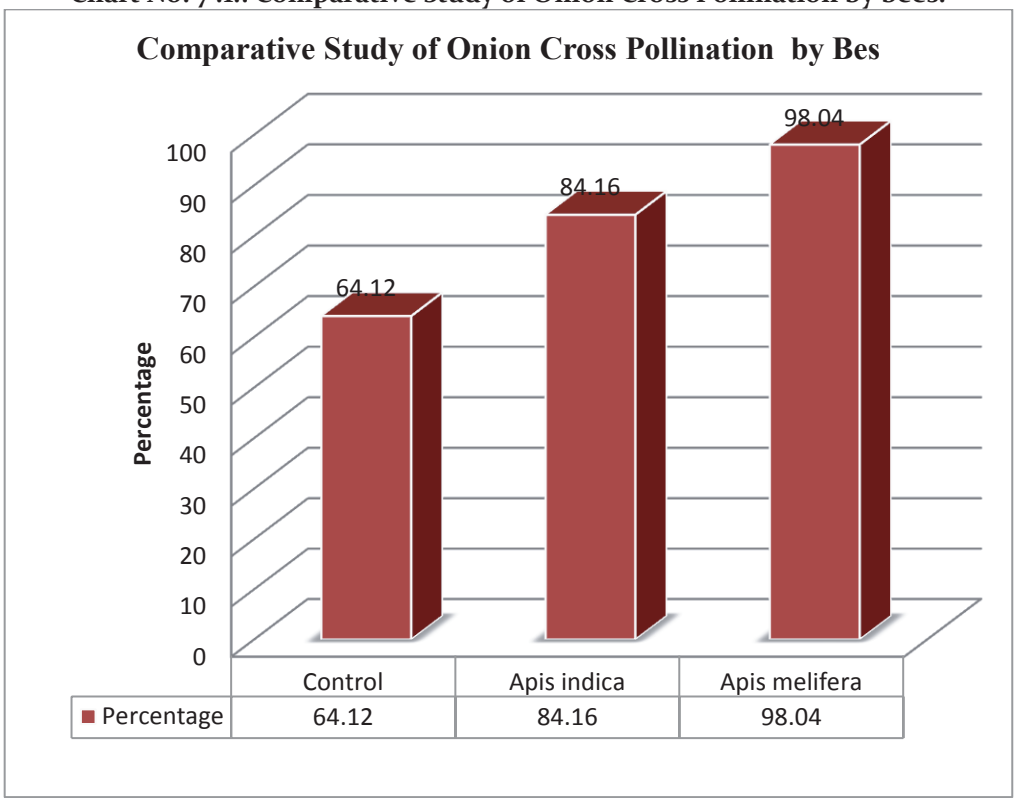


Table No 7.2: Weight of thousand seed of onion which polinated By Bees

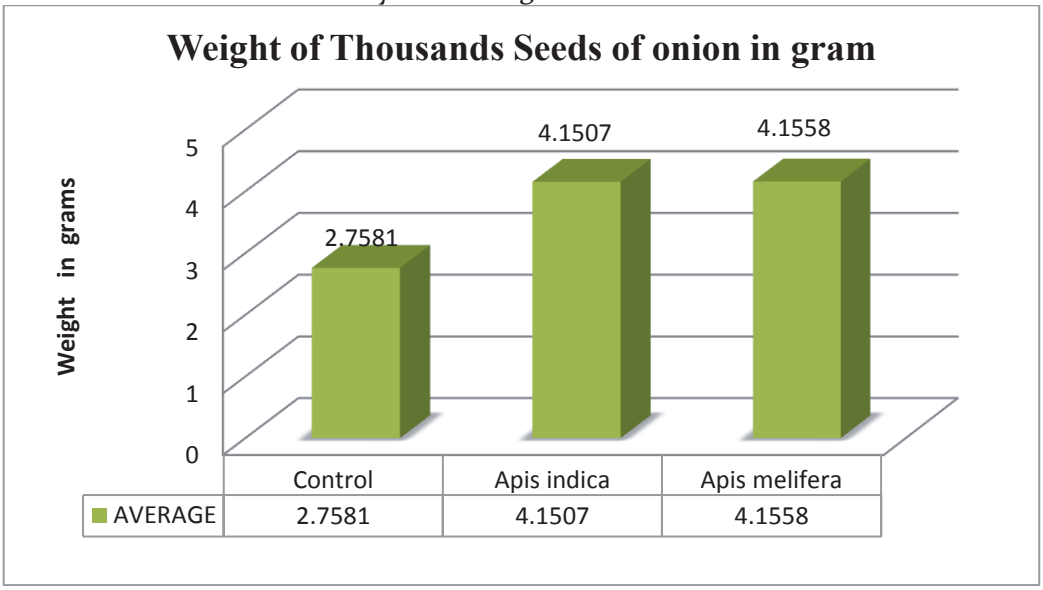
Weight in Grams (gm)

No. of Batches	Control	*Apis indica*	*Apis melifera*
1	2.723	4.152	4.156
2	2.749	4.147	4.161
3	2.754	4.151	4.153

4	2.782	4.153	4.151
5	2.754	4.155	4.157
6	2.764	4.147	4.153
7	2.745	4.145	4.157
8	2.785	4.149	4.158
9	2.758	4.154	4.153
10	2.767	4.154	4.159
Total	27.581	41.507	41.558
AVERAGE	2.7581	4.1507	4.1558
Maximum	2.785	4.155	4.161
Minimum	2.723	4.145	4.151

The Table No.4.10 and chart No.4.15 shows of weight of thousands seeds of onion. The data shoes the maximum weight in control plot is 2.785 gm, in Apis indica plot is4.155 gm and in Pais melliferea polt is 4.161 gm. The minimum weight in control plot is 2.723 gm, in Apis indica plot is4.145 gm and in Pais melliferea polt is 4.151 gm. The average weight of thousand seeds of onion in the control plot is 2.7581gm, in the plot with *Apis indica* is 4.1507 gm. and with *Apis melifera* 4.1558g

Chart No.7 .2: Weight of thousand seed of onion which polinated By Bees. Weight in Grams



Results And Discussion:

Quantitative Study: From each plot twenty five umbels were collected randomly and from each umbel100 seed cone separated for count the seed. Maximum seed sets percentage (98.04 %) was noted in the plot with *Apis melifera* ,84.16 % was noted in the plot with *Apis indica* and 64.12 % in the plot without honey bees.

Qualitative Study: From each plot seeds count the thousand seeds and weigh on single pan digital balance and record the data. Repeat the process 10 times then calculate average weight of thousands onion seeds was in the plot control is 2.7581gm, in the plot with *Apis indica* was 4.1507 gm. and with *Apis melifera* 4.1558gm.

This result indicates that *Apis melifera* is more efficient in pollination than the *Apis indica* . This experiment also indicates that bees are necessary for quantitative and qualitative onion seed setting.

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