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Short Communication

Seed Production Management of Capsicum Hybrid Pusa Deepti

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The exploitation of heterosis has led to the development of hybrid varieties in a number of vegetable crops, including capsicum. Hence, the use of hybrid seed has become popular among the commercial vegetable growers and farmers. In capsicum, hybridization is performed manually, which is a labour intensive process. Consequently, the cost of seed increases making it unaffordable for many farmers. This warrants the economical production of hybrid seed [1]. Further, the hybrids developed by the public sector have little prospects unless immediate efforts are made to produce large quantities of seeds of such hybrids [2]. Therefore, viable hybrid seed production technology should be developed in order to realize the best potential of hybrid varieties [3]. An experiment was undertaken to find out quicker method of manual pollination to lessen the expenditure on labour, to work out the best method of extracting pollen while maintaining maximum viability and to estimate the effect of supervision on efficiency of labour.

The trials were conducted at Naggar farm situated at an elevation of 1500 m above mean sea level. The crop was planted in May 2002, the crosses were made during July and fruits harvested in October-November. The male and female parents used in this crossing programme were Russian Yellow and Yolo Wonder, respectively. In this experiment, four different methods were tried to extract the pollen. First of them was to collect the anthers of the male parent in a Petri dish and expose them to sun for 20 minutes so that they burst (E_1). In the second method (E_2), the anthers were similarly collected in a Petri dish and exposed to heat for 30 minutes under a table lamp (100 W) kept at 20 cm above the seed surface. In the third method (E_3), the anthers were collected on the evening of previous day and kept between two layers of blotting paper overnight (14-15 hrs). The anthers were transferred in a glass vial in the morning. Further, another glass vial was kept on the first one, mouth-to-mouth and separated by placing a fine muslin cloth sieve between the vials so as to facilitate the passage of pollen grains only. Both the vials were held together with glue tape and the pollen was collected in the empty vial by shaking the vials together. Finally, the pollen was transferred to the pollen pit. The fourth method (E_1), traditional method of pollen transfer, involved the extraction of pollen directly from the anther with the help of a forceps, served as control.

Two methods of pollination were used. The first was the traditional method where the anthers were collected and pollen was removed with the help of forceps just before applying it on the stigma of manually emasculated buds. In the other method, pollen was collected in a pollen pit and applied on the emasculated buds by dipping the stigma in the pollen pit. For both the methods, workers were demonstrated the technique and allowed to do it themselves without supervision. Later on, the work was conducted under supervision and data was recorded in order to quantify the effect of supervision. In this experiment the traditional method without supervision was taken as control.

A team of four workers was engaged in the crossing programme. The first one for emasculation, second one for tagging the emasculated bud, the

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third one for applying pollen and the last one for covering the pollinated bud with cotton. The team worked from 9:30 AM till 2:30 PM continuously (5 hrs). The data for time taken in pollination (minutes/bud), viability of pollen as reflected by fruit setting (%) and effect of supervision were recorded. The trial was conducted in randomized block design in 5 replications.

The traditional method of pollination took as much as 4.43 minutes/bud. However, the speed of pollination with traditional method increased when the operation was carried out under supervision (3.74 min/bud). The pollen pit method was significantly quicker as it took only 2.83 min/bud and this could be even faster (1.73 min/bud) when the labourers worked under supervision. Therefore, it is clear that pollen pit method is more efficient than traditional method. Also, it is evident that supervision has a significant effect on the speed of the workers in both the methods. However, all the four methods were comparable in terms of fruit setting (Table 1).

In a similar study to find out the most suitable means of pollen transfer, it was concluded by Pathare *et al.* [4] that pollination with camel hair brush or glass rod with the end tapered to stigma width accompanied by covering with cotton capsules was found to be a superior treatment combination. More congenial microenvironment around the flower created by cotton capsule might be responsible for effective fertilization [5].

The fruit setting amongst the different methods was compared to assess the viability of pollen. It was found that there was no significant difference between fruit setting with pollen extracted by shade drying and applied directly from anther. Both of these methods were far more superior to pollen extraction by drying in sun and by drying under electric bulb (Table 2).

Table 2. Viability of pollen extracted by different methods as reflected by setting percent

Treatments	Temperature	Duration of exposure	Fruit setting(%)
E_1	27-28	20 minutes	60.4
E_2	30	30 minutes	22.6
E_3	10-15	16 hours	79.6
E_4 (control)	Ambient	Nil	81.2

CD at 5% 4.994

When the pollen extraction is done by drying the anthers under sun (E_1) the temperature rises to 27-28°C and it goes above 30°C under the electric bulb (E_2). The conditions are desiccating in both the methods. On the other hand, the night temperature on an average remains between 10-15°C and since the anthers are covered between layers of blotting paper (E_3), the depletion of moisture is sufficient only to cause bursting of anthers. Pollination with the help of forceps (E_4) by drawing pollen directly from anthers allows no

Table 1. Speed of pollination by employing different methods

Treatments	Min/bud	Buds/h	Increase in efficiency(%)	Expense (Rs./bud) @Rs.88/day	Saving in expense due to supervision(%)	Fruit setting (%)
T_1 (control)	4.34	13.82	-	0.93	-	77.6
T_2	3.742	16.03	15.97	0.80	13.97	81.2
T_3	2.826	21.23	53.60	0.60	-	74.4
T_4	1.73	34.7	150.87	0.36	40.00	79.6
CD at 5%	0.5014					NS

Where: T_1 = Pollination by traditional method without supervision, T_2 = Pollination by traditional method with supervision, T_3 = Pollination by pollen pit method without supervision and T_4 = Pollination by pollen pit method with supervision

time for the viability of pollens to deteriorate (Table 2). The differential pollen viability can be attributed to the fact that pollen is subjected to different temperature and humidity conditions during the process of extraction. The high temperature may have resulted in poor fertilization of ovules and consequently low seed setting in E_1 and E_2 treatments.

As we compare the speed of pollination in both the traditional as well as pollen pit method of pollination, supervision results in an increase in efficiency by 15.97 per cent and 150.87 per cent, respectively. It is largely because supervision helps a worker to learn according to their needs, makes best use of their skills and improves their abilities so that the jobs can be done more effectively [5]. This increase in efficiency, of course, saves a lot of expenditure on labour. Obviously, the seedsmen need to employ a supervisor. Assuming that one supervisor has a span of control over 20 workers and he is paid Rs. 150 daily, an additional sum of merely Rs. 7.50 is spent on every pollination worker. Hence, this will result in a saving of 13.97-40 per cent when translated in terms of cost of pollinating each bud (Rs/bud) (Table 1). Further, if the supervisor also joins the team in pollination work, it will serve to save more in terms of time and money. In the light of above observations, use of pollen pit is strongly advocated for pollen transfer in species, where hand emasculation and pollination is practiced. Further, the findings also underline the importance of supervision for increasing the efficiency of workers.

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