STUDIES ON STIGMA RECEPTIVITY AND POLLEN VIABILITY IN PARENTAL LINES OF HYBRID SUNFLOWER (KBSH-1)

Sudhir.P., Jagadish.G.V.,Venkatramana and Ramaiah.H.
National Seeds Project
University of Agricultural Sciences, Bangalore

ABSTRACT

The studies on the stigma veceptivity and pollen viability of parental lines revealed that in CMS 234 A stigma was found to be receptive for 3-4 days under Bangalore conditions and the pollen of RHA 6D-1 when stored under room conditions (25°c and 80%RH) was found to be viable for 54 hours and under refrigerated conditions it was extended upto 78 hours based on seed set per cent in CMS line (12% and 6.9% seed set respectively).

INTRODUCTION

The information on the floral biology aspects such as the duration of stigma receptivity is helpful to know with what interval of time pollination is effective. Thereby, minimum labours can be employed and the hybrid seed production programme becomes much more economical. Also the information on pollen viability is very important for effective utilisation of pollen and to increase the seed yield. At present there is no authentic information whether the left over pollen could be used for pollination on subsequent days. Therefore, this information is most crucial when artificial hand pollination is supplemented for increasing the seed set in hybrid seed production.

MATERIAL AND METHODS

a) STIGMA RECEPTIVITY :

Forty male sterile plants (CMS 234A) of same age group were selected and bagged a day before flowering. Next day morning the total number of disc florts opened in all the capitulums ware marked with the help of pins. Fresh pollen grains were collected daily from male line (RHA 6D-1) with the help of brush and were used for pollination. Five capitulums of the male sterile line were pollinated daily at different starvation levels viz.,0, 1, 2, 3, 4, 5, 6 and 7 days. At maturity capitulums were harvested. The number of seeds in the disc florets from marked area were recorded and per cent seed set was calculated.

(b) POLLEN VIABILITY (in vivo)

Sufficient number of capitulums from male sterile plants were bagged a day prior to anthesis. The total number of disc florets opened on the next day in all capitulums were marked with the help of pins, early in the morning. Sufficient pollen from restorer plants were collected in peterdishes at 9.00 a.m. and stored under laboratory conditions (25 c and 80% RH) and at refrigerated condition. Six capitulums of CMS lines were pollinated at 9.00 hour. The pollination was continued at hourly intervals from 9 to 17 hours with stored pollens. The pollinated capitulums were covered again with muslin cloth bags to avoid out crossing. The capitulums were harvested at maturity. The number of seeds and disc florts from marked area of capitulum were recorded. The per cent seed setting was calculated.

BRESULTS AND DISCUSSION

(a) STIGMA RECEPTIVITY

The results on stigma receptivity of seed parent CMS 234A as reflected by the percentage of seed filling are presented in Table-1.

Stigma receptivity differed as the age of florets increased. Stigma was highly receptive when the florets were pollinated on the day after emergence, based on maximum seed seed filling (92.32%) and the receptivity stadily decreased as the age advanced and it was zero after 6 days of starvation. The seed filling percentage reflecting stigma recetivity after one, two and three days after emergence were found to be on par with each other. Stigma receptivity reduced drasfically after 3rd day and 4th day, which was reflected by 35.11 and 2.97 per cent seed set respectivily. This infers that the stigma should receive the pollen within 2 days after its emergence for seed setting. Pollination can be done even on 3rd day and 4th day after stigma emergence depending upon the availability of pollen. Similar results have been found by Aun (1991). Borikar et.al. (1993) and Patil et.al. (1993) have reported that stigma was receptive for 3-4 days in 338 A and 207 A lines of sunflower.

(b)POLLEN VIABILITY (in Vivo)

Based on the seed set percentage on CMS line, the fresh pollen of 6D-1 gave highest seed set of 91.67% (Table-2). Pollen

when stored at room conditions (25 c and 80%RH) and pollinated after 24 hours of storage gave 75.33% seed set. However, when pollinated within 8 hours of storage gave higher per cent of seed set (> 80%). Further, there was a drastic reduction in per cent seed set with an increase in storage period from 32 hours (50%) to 54 hour (12%). There was no seed set after 56 hour of storage, indicating complete loss of viability.

When pollen was stored under refrigerated condition the per cent seed set remained higher till 24 hours of storage. Though there was a similar trend of decrease in per cent seed set as that of ambient storage, the rate of reduction was slow. More than 50 per cent seed set could be obtained even after 54 hours of storage.

The reduction in per cent seed set with the increase in storage period due to reduction in pollen viability could be prolonged for one day when stored in refrigerator. Similar result has been reported by Singh et al. (1979) in sorghum.

CONCLUSION

In CMS 234A, the stigma was found to be receptive for 3-4 days under Bangalore conditions. However, for better yields it is recommended to pollinate within 3 days after emergence of stigma. The pollen when stored under room conditions was viable for 54 hours and under refrigerator conditions upto 78 hrs based an seed set percentage.

REFERENCES

ANONYMOUS, 1991, Proceedings of meeting of the All India coordinated Research Project an seed Technology Research held APAU, Hyderabad from May 30-31, 1991.

Borikar,S.T., Choulwar,S.B., Singh,A.R., Solunke,B.R. and More,P.R., 1993, Stigma receptivity and pollen viability in sunflower. Seed Tech. News, 23 (2) 10-11

Keshavamurthy,M.N., Nanjareddy, Y.A., Umashankar,R. and Virupakshappa,K., 1994, Development of suitable germination medium for trinucleate pollen grain; An illustration with Sunflower. J.oilseed Research.

Patil,M.A., Borikar,S.T., Bilapate,G.C. and Phad, H.B.,1993, Studies on seed production problems and technology for increasing production of sunflower hybrids and their parental lines. Seed Tech. News. 23(3):3-12.

Singh, A.R., Nayeen, S.A. and Chopde,P.R., 1979, Stigma receptivity studies in cytoplasmic male sterile lines 9 Sorghum hybrids. Seed Res., 7(2) 92-97.

Table-1 : Duration of stigma receptivity of CMS 234-A as reflected percentage of ssed filling.

Days after stigma emergence	Per cent seed set
0	79.55 (63.53)
1	92.32 (73.94)
2	89.53 (71.14)
3	87.01 (69.45)
4	35.11 (36.28)
5	2.97 (9.81)
6	0.00
S.Em.+	2.68
C.D (5%)	8.09

Figures in paranthoses are arc sine transformed values

Table 2: Per cent seed filling as affected by pollination using stored pollen.

Duration of pollen storage (hrs)	Seed filling percentage	
	pollen stored under labo - ratory condition 25 c & 80% RH	Pollen stored under re- frigerated condition 4 °c & 50% RH
0	91.67 (73.16)	91.67 (73.16)
2	90.60 (71.67)	91.51 (73.05)
4	88.70 (70.24)	90.93 (72.47)
6	85.68 (68.03)	88.88 (70.51)
8	84.61 (67.11)	88.00 (70.12)
24	70.33 (60.46)	83.39 (66.23)
26	65.39 (54.19)	76.62 (61.53)
28	61.66 (51.88)	76.00 (61.41)
30	53.61 (47.42)	72.61 (58.80)
32	50.00 (45.20)	71.04 (57.370
48	39.33 (39.20)	65.39 (54.41)
50	35.31 (36.64)	63.32 (53.03)
52	19.60 (26.61)	58.61 (50.20)
54	12.00 (20.61)	51.66 (46.22)
56	-	43.69 (41.59)
72	-	39.62 (41.19)
74	-	30.00 (33.38)
76	-	14.33 (22.37)
78	-	6.91 (15.23)
S.Em +	1.24	0.99
C.D (5%)	3.61	2.76

Figures in parantheses are arc sine transfored values