ISSN : 2350-0743

www.ijramr.com

International Journal of Recent Advances in Multidisciplinary Research
Vol. 10, Issue 07, pp. 8604-8607, July, 2023

RESEARCH ARTICLE

INFLUENCE OF CROSSING TECHNIQUES ON PRODUCTION OF QUALITY SEED IN BHENDI

[1,*]Srinivasan, J., [2]Jalapathi, E. and [3]Mugilan, K.

[1]Assistant Professor, Department of Agriculture, Karunya Institute of Technology and Science, Coimbatore.
[2]Senior Research Fellow, Central Institute for Cotton Research (CICR),Regional Research Station, Coimbatore.
[3]Centre for Agricultural and Rural Development Studies, Tamilnadu Agricultural University, Coimbatore

ARTICLE INFO

Article History:
Received 18th April, 2023
Received in revised form
10th May, 2023
Accepted 26th June, 2023
Published online 30th July, 2023

Key words:
Abelmoschus esculentus (L.) Moench.

ABSTRACT

An investigation was carried out in JF-55 (Male parent) & Pusa Sawani (Female parent) to find out the effect of emasculation and bud pollination in comparison with emasculation and conventional pollination technique. The Crossing Techniques (CT) were evaluated for the crossing period of seven weeks and analysed for fruit set, seed yield and seed quality characters at weekly intervals. The results revealed that irrespective of the crossing period, bud pollination recorded 6% higher fruit set than conventional pollination. Among the crossing periods, bud pollination and conventional pollination recorded higher fruit set of 88% and 82% respectively at the crossing period of 4th week. The yield attributing characters, seed and seedling quality characters were also higher at the crossing period of 4th week of flowering period.

INTRODUCTION

Okra (*Abelmoschus esculentus (L.) Moench*) has hold a key rank in vegetables it is prefered fruit vegetable cultivated richly in the subtropical, tropical and warm region of the world as India, Turkey, Africa and other neighbouring countries. In India, okra is a most prominent vegetable crop cultivated for its fresh soft green fruits during rainy and summer seasons. Okra is called by different regional names in different area of the world. It is known as Bhendi in India, Gumbo in U.S.A. and lady's finger in England. Sizeable export of okra is being done to GCC and EU markets. India is the biggest producer of okra ranked first (72.9%) in the world (Anonymous 2017). Okra is available throughout the year and country has the required infrastructure for export. There is still scope to expand the export to markets of GCC, EU and Singapore. Okra crop covered 5.05% of total area and 3.46% of total vegetable production. It occupies fifth position, next to tomato, in area under vegetables in the country with a production of 33.24 lakh metric tonnes from an area of 3.47 lakh hectares. The crop is cultivated for its young tender fruits, used in curry and soups after cooking The okra production of World increased from 1.82 million tonnes in 1972 to 10.8 million tonnes in 2021 growing at an average annual rate of 3.85%.In hybrid seed production of bhendi, techniques for improvement in fruit set is highly warranted for realizing better seed yield as it is affected by crossing techniques, crossing periods, genotypes and environmental conditions.

Corresponding author: Srinivasan, J.,
Assistant Professor, Department of Agriculture, Karunya Institute of Technology and Science, Coimbatore.

In bhendi, conventionally hybrid seed is produced by emasculating the flowers which open on the next day and dusting the same flowers during next day morning, but this conventional method of pollination results in low number of fruit set due to drying of the stigmatic surface before it gets pollinated. Doddagoudar (2005) reported that the problem could be overcome by bud pollination where the flowers are pollinated immediately after emasculation.

MATERIALS AND METHODS

Bulk crop of bhendiJF-55 (Male parent)&PusaSawani(Female parent) was raised in block system raised in an isolation of 400 meters between the parental lines adopting the plots of size 4 x 4 m^2 which account for 50 plants per plot. At flowering, as treatmental evaluation, the female flowers were emasculated at 1st, 2nd 3rd, 4th, 5th, 6th, and 7th week after first flowering in adequate number and were dusted immediately with the pollen collected from the male parent and covered with butter paper cover. The dusting of pollen on one day old emasculated female flower formed the check which is being practiced in general for hybrid seed production. The experiment was conducted adopting randomized block design with four replications. The crop was raised adopting the normal package of practices (Anon, 1999). On maturation, the fruits were harvested and evaluated for the following seed yield and seed quality characters.

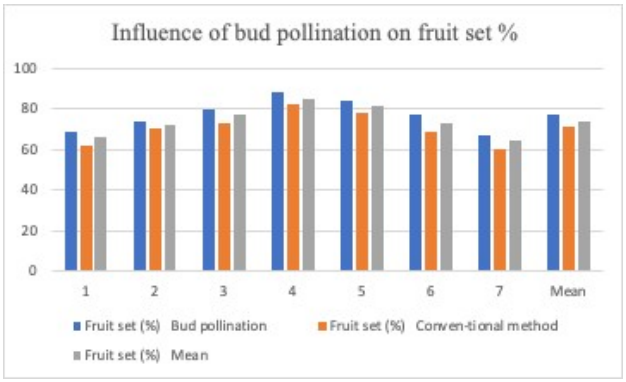

Fig 1. Influence of bud pollination on fruit setting percentage

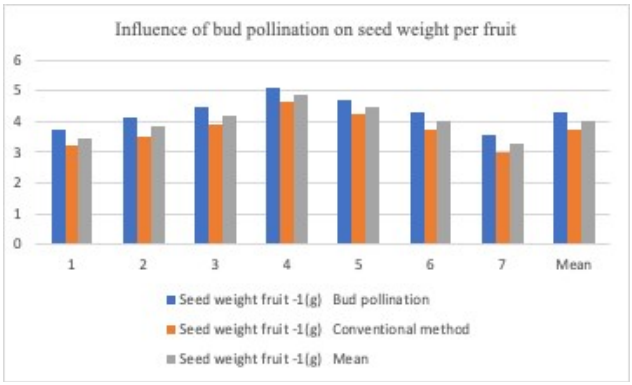

Fig 2. Influence of bud pollination on seed weight per fruit

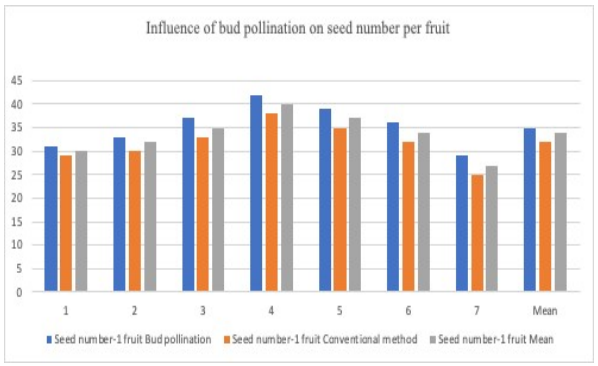

Fig 3. Influence of bud pollination on seed number per fruit

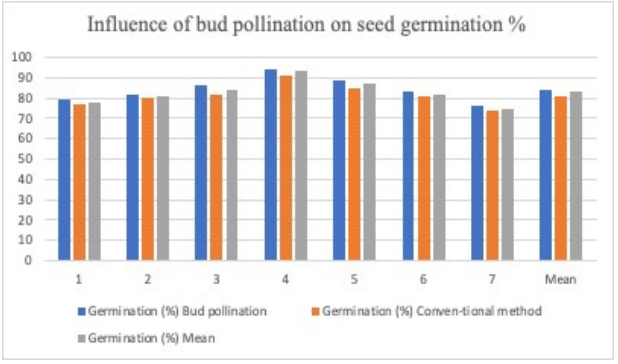

Fig 4. Influence of bud pollination on seed germination percentage

RESULTS AND DISCUSSION

Bhendi is an often cross pollinated crop with continuous flowering habit having the anther shaped like a hallow tube. In this crop the pollen shed in abundance between 10.00 am to 4.00 pm.

Hence the present investigation was carried out in bhendi JF-55 (Male parent) & Pusa Sawani (Female parent) to find out the effect of bud pollination (pollinating immediately after emasculation) in comparison with the normal /conventional pollination technique (emasculating the flower first day evening and cover it with butter paper cover and then pollinating in the next day morning after removal of the butter paper cover and dusting with the pollen of male parent).The comparison of the pollination techniques were also evaluated throughout the flowering period upto seven weeks at weekly interval as the harvesting period extends to 50-60 days after flowering and were analysed for fruit set, seed yield attributing characters and seed quality characters. Between the crossing techniques, bud pollination recorded the higher fruit set (77%) while it was 71 per cent in conventional method. Among the crossing periods 4th week after flowering recorded the highest value (85%), while it was the lowest in 7th week after flowering (64 %).

In the interaction effect at all crossing periods bud pollination recorded higher fruit set percentage (Table 1). Among the crossing techniques bud pollination recorded the more seed weight (4.29 g) than the in conventional method (3.75 g). Among the crossing periods 4th week of flowering (4.87 g) recorded the maximum seed weight, while the lower seed weight was recorded at 7th week of flowering (4.02 g). In the interaction effect at all crossing periods bud pollination recorded maximum seed weight (Table 1). Among the crossing techniques, significantly higher seed number fruit^{-1} (35)were observed in bud pollination and lesser was recorded in conventional method (32). Within the crossing periods the 4th week after flowering recorded the highest value of seed number fruit^{-1} (40), while it was the lowest in 7th week after flowering (27). Hedrick and Booth, (1979) also refer that bud pollination increases the seed set and number of seeds per fruit in tomato. In the interaction effect at all crossing periods bud pollination recorded higher seed number fruit^{-1} (Table 2). Between the crossing techniques, bud pollination recorded the maximum 100 seed weight (5.47g), while it was the minimum (5.11 g) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of 100 seed weight (6.13 g), while the lowest was by seeds obtained from 7th week after flowering (4.18 g). In the interaction effect at all crossing periods bud pollination recorded higher 100 seed weight (Table 2).

Among the crossing techniques, bud pollination recorded the maximum fruit length(17.55 g), while it was the minimum (17.12 g) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of fruit length (18.88 g), while the lowest was by seeds obtained from 7th week after flowering (16.43 g). In the interaction effect at all crossing periods bud pollination recorded higher fruit length (Table 3).Between the crossing techniques, bud pollination recorded the maximum fruit girth(4.68 g), while it was the minimum (4.44 g) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of fruit girth (5.22g), while the lowest was by seeds obtained from 7th week after flowering (3.98 g). In the interaction effect at all crossing periods bud pollination recorded higher fruit girth (Table 3). The results revealed that irrespective of the flowering period, bud pollination i.e. dusting of pollen immediately after pollination was found to be significant in enhancing the fruit set, yield attributing characters *viz.* fruit weight, number of seeds fruit^{-1}, seed weight fruit^{-1}, 100 seed weight and seed quality *viz.* germination, seedling growth and vigour.

Table 1. Influence of crossing periods and crossing techniques on fruit set (%) and seed weight fruit^{-1} (g) of bhendi

Crossing periods(CP)/weeks after flowering	Crossing techniques (CT)					
	Fruit set (%)			Seed weight fruit $^{-1}$(g)		
	Bud pollination	Conven-tional method	Mean	Bud pollination	Conventional method	Mean
1	69	62	66	3.72	3.22	3.47
2	74	70	72	4.13	3.52	3.83
3	80	73	77	4.48	3.91	4.20
4	88	82	85	5.12	4.62	4.87
5	84	78	81	4.73	4.24	4.49
6	77	69	73	4.31	3.74	4.03
7	67	60	64	3.54	2.98	3.26
Mean	77	71	74	4.29	3.75	4.02
	CT	CP	CP X CT	CT	CP	CP X CT
SEd	0.476	0.890	1.259	0.002	0.003	0.005
CD	0.978**	1.830**	2.588**	0.004**	0.007**	N.S

* *significant at 1% level, *significant at 5% level

Table 2. Influence of crossing periods and crossing techniques on seed number^{-1} fruit and 100 seed weight (g) of bhendi

Crossing periods (CP) / weeks after flowering	Crossing techniques (CT)					
	Seed number^{-1} fruit			100 seed weight (g)		
	Bud pollination	Conven-tional method	Mean	Bud pollination	Conven-tional method	Mean
1	31	29	30	4.83	4.45	4.64
2	33	30	32	5.36	4.93	5.15
3	37	33	35	5.84	5.54	5.69
4	42	38	40	6.34	5.91	6.13
5	39	35	37	6.03	5.71	5.87
6	36	32	34	5.63	5.12	5.38
7	29	25	27	4.23	4.12	4.18
Mean	35	32	34	5.47	5.11	5.29
	CT	CP	CP X CT	CT	CP	CP X CT
SEd	0.002	0.003	0.005	0.476	0.890	1.259
CD	0.004**	0.007**	0.010**	0.978**	1.830**	2.588**

* *significant at 1% level, *significant at 5% level

Table 3. Influence of crossing periods and crossing techniques on fruit length (cm) and fruit girth (cm) of bhendi

Crossing periods(CP)/weeks after flowering	Crossing techniques (CT)					
	Fruit length (cm)			Fruit girth (cm)		
	Bud pollination	Conven-tional method	Mean	Bud pollination	Conven-tional method	Mean
1	15.87	15.56	15.72	4.32	3.92	4.12
2	17.12	16.71	16.92	4.41	4.12	4.27
3	17.92	17.62	17.77	4.86	4.71	4.79
4	19.12	18.64	18.88	5.32	5.12	5.22
5	18.77	18.14	18.46	5.04	4.92	4.98
6	17.43	16.93	17.18	4.68	4.42	4.55
7	16.65	16.21	16.43	4.11	3.84	3.98
Mean	17.55	17.12	17.34	4.68	4.44	4.56
	CT	CP	CP X CT	CT	CP	CP X CT
SEd	0.002	0.003	0.005	0.476	0.890	1.259
CD	0.004**	0.007**	0.010**	0.978**	1.830**	2.588**

* *significant at 1% level, *significant at 5% level

Table 4. Influence of crossing periods and crossing techniques on germination percentage and root length (cm) of bhendi

Crossing periods (CP)/ weeks after flowering	Crossing techniques (CT)					
	Germination (%)			Root length (cm)		
	Bud pollination	Conven-tional method	Mean	Bud pollination	Conven-tional method	Mean
1	79	77	78	13.6	13.1	13.4
2	82	80	81	14.4	13.8	14.1
3	86	82	84	15.8	14.7	15.3
4	94	91	93	16.9	15.7	16.3
5	89	85	87	16.2	15.1	15.7
6	83	81	82	15.1	14.4	14.8
7	76	74	75	13.2	12.5	12.9
Mean	84	81	83	15.03	14.19	14.61
	CT	CP	CP X CT	CT	CP	CP X CT
SEd	(0.662)	(1.238)	(1.750)	0.093	0.174	0.246
CD	(1.360**)	(2.544**)	N.S.	0.191**	0.357**	0.505**

* *significant at 1% level, *significant at 5% level

Table 5. Influence of crossing periods and crossing techniques on shoot length(cm) and vigour index of bhendi

Crossing periods (CP)/ weeks after flowering	Crossing techniques (CT)					
	Shoot length(cm)			Vigour index		
	Bud pollination	Conven-tional method	Mean	Bud pollination	Conven-tional method	Mean
1	6.4	6.0	6.2	1490	1369	1429
2	7.1	6.5	6.8	1763	1624	1693
3	7.8	7.4	7.6	2030	1812	1919
4	8.9	8.6	8.75	2425	2211	2317
5	8.5	8.2	8.35	2198	1981	2088
6	7.6	7.2	7.4	1884	1750	1816
7	6.3	5.9	6.1	1572	1463	1517
MEAN	7.51	7.11	7.31	1897	1734	1815
	CT	CP	CP X CT	CT	CP	CP X CT
SE.D	0.045	0.084	0.118	12.280	22.974	32.49
CD	0.925**	0.172**	N.S	25.242**	47.224**	66.79**

* *significant at 1% level, *significant at 5% level

Between the crossing techniques, bud pollination recorded the maximum germination (84 %), while it was the minimum (81%) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of 100 seed weight (6.13 g), while the lowest was by seeds obtained from 7th week after flowering (75%). (Table 4).Between the crossing techniques, bud pollination recorded the maximum germination (84 %), while it was the minimum (81%) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of germination (93 %), while the lowest was by seeds obtained from 7th week after flowering (75%). (Table 4).Among the crossing techniques, bud pollination recorded the maximum shoot length (15.03 cm), while it was the minimum (14.19 cm) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of shoot length (16.3 cm), while the lowest was by seeds obtained from 7th week after flowering (12.9 cm). (Table 4).

Among the crossing techniques, bud pollination recorded the maximum root length(7.51 cm), while it was the minimum (7.11 cm) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of root length (8.75 cm) while the lowest was by seeds obtained from 7th week after flowering (6.1 cm). (Table 5).Between the crossing techniques, bud pollination recorded the maximum vigour index (1897), while it was the minimum (1734) in conventional method. Among the crossing periods the 4th week after flowering recorded the highest of germination (2317) while the lowest was by seeds obtained from 7th week after flowering (1517) (Table 5). Similar result was also reported by Yogeesha (1999) in brinjalat all periods of crossing, the yield attributing characters viz. fruit weight, seed weight fruit^{-1}, seed number fruit^{-1}, seed recovery and 100 seed weight were higher with fourth week irrespective of crossing techniques.

Within the periods of time, irrespective of the pollination technique, the said yield attributing characters increased gradually from first week to fourth week and reduced again from fifth week to seventh week, but the reduction rate was higher in later weeks (5-7) than in the initial weeks(1-3), which might be due to the depletion of food materials at later stages of crop growth or decrease in the recovery of normal sized seed as picking advances or due to the ageing of the plant or the reduced size and weight of the seed (Townsend, 1972).

REFERENCES

Anon, 1999. Crop production guide. Govt. of Tamil Nadu. pp.123.

Anonymous, 2017. International rules for seed testing. Seed Sci. and Technol. 2017; 32:1-334.

Doddagoudar, R.S. 2005. Effect of crossing periods and boll setting percentage in cotton. J. Ind.Soc. Cotton Improvement 27(3):32-35.

Hedrick, J.K. and F.N.Booth. (1979).Studies on hybrid tomato seed production Crop Sic., 17: 277-284.

Priestley, D. A. 1986. Seed ageing, implications for seed storage and persistence in soil. In: DA Priestley(ed.)SeedAging.New York.Comstock Publishing Associates,pp. 125-195.

Townsend, V.R. 1972. Effect of picking stages on seed quality. Nature, 198 : 92

Yogeesha, P.A. 1999. Influence of Influence of picking periods on seed yield and quality in brinjal. Seed Res., 27(2):112-114.

****