

Short Communication

Influence of Location and Date of Sowing on Flowering Behaviour in Parental Lines of RSFH-1 Sunflower Hybrid

V.C. UMESH, RAVI HUNJE, H.L. NADAF AND B.S. VYAKARNAHAL

Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad 580 005
ravihunje@rediffmail.com

Sunflower (*Helianthus annuus* L.) is a cross pollinated crop, ideally suited for exploitation of heterosis. The discovery of cytoplasmic genetic male sterility in sunflower has led to the development of hybrids for commercial cultivation. Selected parents of hybrids differ phenotypically and the success of hybrid seed production depends among several factors, synchronization of flowering is a pre requisite. Flowering behaviour of parental lines vary from location to location and season to season [1]. Therefore, the study was under taken on the flowering behaviour of parental lines (male R-64NB and female CMS-103A) of hybrid RFSH-1 on different sowing dates to achieve better synchronization of flowering.

A field experiment was conducted simultaneously at Water and Land Use Management Institute (WALMI), Dharwad and Agricultural Research Station (ARS), Bagalkot, to study the flowering behaviour of parental lines of RSFH-1 (Raichur Sunflower Hybrid-1). The seeds of parental lines were sown simultaneously at 15 days interval starting from July 2003 to March 2004 in three replications. The parental lines were sown in 16m² area with spacing of 60 cm x 30 cm with 1:1 female to male planting ratio. All the recommended agronomical and plant protection measures were carried out. The observations on days to 50 per cent flowering were recorded in both parental lines. The meteorological data *viz.*, maximum and minimum temperature, relative humidity and rainfall were recorded for the fortnight from July 2003 to March 31st 2004 and presented in table 2a and 2b.

Bagalkot location took significantly less number of days for 50 per cent flowering of female (60.8) and male (67.5) parents with a difference of 6.6 days as compared to Dharwad (62.5 and 70.1 days, respectively) with a difference of 7.5 days.

Although significant differences were observed between the parental lines for 50 per cent flowering due to different dates of sowing, the closest synchrony of flowering between female and male parent was not observed in all the dates of sowing in both the locations (Table 1).

Irrespective of locations, female parent flowered earlier to male in all the dates of sowing. The female parent took a longer period of 65.3 to 66.2 days for flowering when sowing was taken up during the months of December. During the flowering the maximum and minimum temperature were comparatively low (Tables 2a and 2b). When the crop was sown during July, August and March the female parent flowered earlier within a period ranging from 58.6 to 59.6 days, when the atmospheric temperature was relatively high with bright sunshine hours and low rainfall. It can therefore, be inferred that CMS103A flowered early when the crop is sown in July, August and March *i.e.*, with 58.6 to 59.6 days. The flowering is prolonged for 65.3 to 66.2 days, when the sowing was taken up during the month of December due to the slow growth of crop.

In case of the male parent (R-64NB), the flowering duration was very short (64 days) when the crop was sown in the month of July. The 15th

Received March 2006

Revised January 2007

Accepted April 2007

Table 1. Effect of location and date of sowing on days to 50 per cent flowering in parental lines of RSFH-1 sunflower hybrid

Treatments	Female (CMS-103A)		Mean	Male (R-64NB)		Mean	Dharwad (A-R)	Bagalkot (A-R)
	Dharwad	Bagalkot		Dharwad	Bagalkot			
	(L ₁)	(L ₂)		(L ₁)	(L ₂)			
D ₁ - 1 st July	59.0	58.2	58.6	65.2	63.4	64.3	-6.2	-5.2
D ₂ - 15 th July	59.4	58.7	59.1	65.4	63.1	64.3	-6.0	-4.5
D ₃ - 1 st August	60.1	58.2	59.2	66.4	63.6	65.0	-6.3	-5.3
D ₄ - 15 th August	60.4	58.0	59.2	67.1	64.3	65.7	-6.7	-6.3
D ₅ - 1 st September	61.0	58.6	59.8	67.2	64.9	66.1	-6.2	-6.3
D ₆ - 15 th September	62.3	59.0	60.7	68.6	65.4	67.0	-6.2	-6.4
D ₇ - 1 st October	63.2	60.4	61.8	70.7	66.8	68.7	-7.4	-6.3
D ₈ - 15 th October	63.4	61.3	62.4	71.2	68.0	69.6	-7.8	-6.7
D ₉ - 1 st November	64.3	62.1	63.2	72.4	69.3	70.9	-8.1	-7.2
D ₁₀ - 15 th November	65.7	63.3	64.5	74.1	70.3	72.2	-8.5	-7.0
D ₁₁ - 1 st December	66.2	64.4	65.3	75.0	72.6	73.8	-8.8	-8.1
D ₁₂ - 15 th December	67.2	65.2	66.2	76.4	73.7	75.1	-9.2	-8.4
D ₁₃ - 1 st January	65.4	64.2	64.8	74.2	71.4	72.8	-8.8	-7.2
D ₁₄ - 15 th January	64.2	63.4	63.8	72.6	70.7	71.6	-8.3	-7.2
D ₁₅ - 1 st February	62.0	61.3	61.7	70.3	68.1	69.2	-8.3	-6.8
D ₁₆ - 15 th February	62.4	61.7	62.1	70.3	68.2	69.3	-7.9	-6.6
D ₁₇ - 1 st March	59.4	59.3	59.4	67.4	66.5	67.0	-8.0	-7.1
D ₁₈ - 15 th March	60.3	58.4	59.7	68.1	65.4	66.8	-7.8	-7.0
Mean	62.6	60.9		70.2	67.5			
For comparing the means of	S.Em+	CD at 5%		S.Em+	CD at 5%			
L	0.08	0.52		0.13	0.81			
D	0.35	0.99		0.38	1.07			
D at same level of L	0.50	NS		0.54	NS			
L at same or different level of D	0.48	NS		0.54	NS			

NS - Non significant

December sown crop flowered after 75 days. This delay in flowering is attributed to the low temperature prevailed during the growth period of the crop (Tables 2a & 2b).

The difference in days to 50 per cent flowering between the female and male parent was minimum during July 15th sowing and it increased gradually up to December 15th sowing and it again decreased from January 1st sowing to March 15th sowing (Table 1). Similar genotypic variation in flowering

duration due to different dates of sowing was observed [2, 3 & 4].

The better synchronisation of flowering between parental lines of RSFH-1 sunflower hybrid seed production is achieved by sowing male parent six to seven days earlier to female in *kharif* season and seven to nine days in the winter and summer season at Dharwad. Similarly, at Bagalkot male parent should be sown four to six, six to eight and six to seven days early to female parent during *kharif*, winter and summer season, resp

Table 2a. Meteorological data during the investigation period at WALMI, Dharwad

Period	Total rainfall	Mean temp.(°C)		Mean relative humidity (%)
		Max.	Min.	
July 1-15, 2003	4.5	26.96	20.92	86.91
July 16-31	10.6	27.40	21.63	76.53
August 1-15	Tr.	28.27	21.12	73.03
August 16-31	8.6	26.11	20.68	84.16
September 1-15	6.1	27.38	19.64	80.16
September 16-30	10.0	26.26	20.22	70.99
October 1-15	32.2	30.63	17.4	67.63
October 16-31	16.5	30.98	19.25	66.55
November 1-15	1.9	30.72	18.62	65.26
November 16-30	0.0	30.5	14.92	55.06
December 1-15	0.0	29.89	13.36	50.43
December 16-31	0.0	29.81	14.33	52.15
January 1-15, 2004	0.0	28.96	13.4	50.24
January 16-31	0.0	30.20	15.91	57.52
February 1-15	0.0	31.47	15.74	52.73
February 16-28	0.0	33.60	16.99	52.42
March 1-15	0.0	36.26	17.99	41.30
March 16-31	0.0	36.75	21.04	55.09
Total	90.4			

Table 2b. Meteorological data during the investigation period at ARS, Bagalkot

Period	Total rainfall	Mean temp.(°C)		Mean relative humidity (%)
		Max.	Min.	
July 1-15, 2003	20.8	27.98	23.07	75.85
July 16-31	27.2	30.20	23.56	69.11
August 1-15	7.8	30.06	22.48	74.53
August 16-31	10.6	27.75	21.71	78.53
September 1-15	4.0	29.16	21.15	72.75
September 16-30	1.2	30.19	21.99	81.53
October 1-15	57.2	29.48	21.70	70.19
October 16-31	17.0	30.40	20.36	65.16
November 1-15	5.2	29.34	19.96	59.27
November 16-30	0.0	29.33	16.78	56.96
December 1-15	0.0	28.43	13.56	52.28
December 16-31	0.0	28.04	15.58	66.55
January 1-15, 2004	0.0	28.14	13.83	65.86
January 16-31	0.0	30.11	15.92	67.95
February 1-15	0.0	30.12	16.28	67.40
February 16-28	0.0	32.75	17.42	62.98
March 1-15	0.0	34.9	19.50	64.03
March 16-31	0.0	37.9	21.22	69.74
Total	151.0			

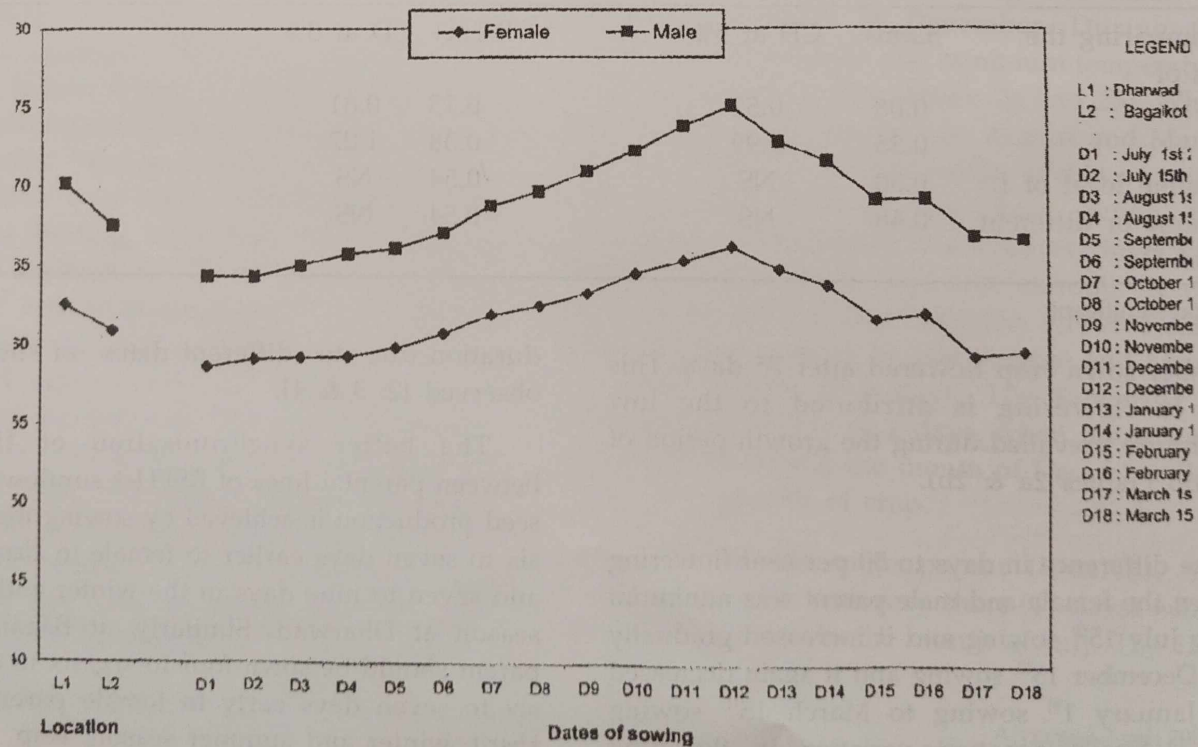


Fig. 1. Effect of location and date of sowing on days to 50% flowering in parental lines of RSFH-1 sunflower hybrid

REFERENCES

1. PATIL, M.A., S.T. BORIKAR, G.G. BILAPATE & H.B. PHAD (1993). Studies on seed production problems and technology for increasing production of sunflower hybrids and their parental lines. *Seed Tech News*, **23**(2): 3-12.
2. UJJINIAIAH, U.S., H.G. SHAMBULINGAPPA & K. DEENAPPA (1988). Effect of sowing dates on synchronization of flowering in BSH-1 sunflower parents. *Curr. Sci.*, **17**: 88-90.
3. KEMPEGOWDA, H. (1992). Effect of planting design and staggered sowing of parental lines on seed yield and quality in KBSH-1 hybrid sunflower (*Helianthus annuus* L.). M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Bangalore.
4. JAGADISH, G.V., VENKATARAMANA & N. VIJAYA MOHANA REDDY (1996). Flowering behaviour of parental lines of hybrid sunflower. In: *Proceedings of International Sunflower Conference, held in Beijing Shenyang, P. R. China from 12-20 June 1996, ISA France*, **2**: 948-951.