Indian Journal of Agronomy 44 (3) : 621–623 (September 1999)

Effect of sowing date, sowing methods and seed soaking on yield and oil content of rainfed safflower (*Carthamus tinctorius*) grown in Kalahandi, Orissa

D. K. BASTIA, A. K. ROUT, S. K. MOHANTY AND A. M. PRUSTY

Regional Research Station, Orissa University of Agriculture and Technology, Bhawanipatna, Kalahandi 766 001

Received: May 1998

ABSTRACT

In a field experiment conducted at Bhawanipatna the maximum grain yield of safflower was noticed in 1 November sowing (12.13 q/ha) which was 19% and 39% higher than the 15 November and 30 November sowing, respectively. Seed soaking for 12 hr was found beneficial and registered grain yield of 11.65 q/ha. Line sowing recorded significantly better yield (10.98 q/ha) than broadcast sowing. The oil content of seeds was highest at earliest sowing (30.61%) which was 1.3% to 4.4% higher than successive sowings respectively.

Key words : Safflower, Sowing date, Sowing method, Seed soaking

Agriculture in Kalahandi district of Orissa is predominantly rainfed. Rapid soil moisture depletion after cessation of *kharif* rains makes this zone highly vulnerable for a successful second crop. Safflower (*Carthamus tinctorius* L.) being a deep rooted crop, completes its life cycle on residual moisture. But its low productivity is observed to be mostly due to untimely sowing and less plant population.

Though it has got a high value oil and production potentiality in this zone, very little work has been done for its productivity. Keeping this in view, the present experiment was undertaken at Regional Research Station, Bhawanipatna, to find out the effect of date of sowing, method of sowing and seed soaking in water on grain yield and oil content of safflower.

MATERIALS AND METHODS

The field experiment was conducted during winter season of 1993-96 at Bhawanipatna, Orissa. The soil of the experimental plot was clayey in texture with pH 7.1 and low in organic carbon 0.40%, low in available P (7.76 kg/ha) and moderate in available K (258 kg/ha). Eighteen treatment combinations were laid out in the split-split plot design with 3 replications. Safflower 'Bhima' was taken for trial in all the 3 years. The main plot received 3 dates of sowing 1 November (D_1); 15 November (D_2); and 30 November (D_3); however, in the

subplot 2 methods of sowing, viz. line sowing at 30 cm spacing (M_1) and broadcast (M_2), and in the sub-subplot 3 water soaking treatments, i.e. no soaking (S_1), 8 hr soaking (S_2) and 12 hr soaking (S_3) were adjusted. A seed rate of 15 kg/ha was used in all the treatments. All the treatments received an uniform fertilizer dose of $N:P_2O_5:K_2O$: 25:25:0 kg/ha. Plant protection measures were taken as and when required in all the 3 years of experimentation. The oil content of the safflower seeds were analysed by NMR method. The amount of precipitation received during 3 growing seasons were 19, 48 and 90 mm respectively.

RESULTS AND DISCUSSION

Grain yield

The grain yield of safflower was significantly influenced by date of sowing, method of sowing and seed soaking treatments in all the 3 years of experimentation (Table 1). The first date of sowing, i.e. 1 November recorded highest grain yield over the years, with an average of 12.13 q/ha. The yield reduction in 2nd and 3rd date of sowing was 19.2 and 38.9% respectively which was due to rapid depletion of soil moisture from the root zone through the growing season of the crop. Line sowing treatment exhibited higher grain yield (10.98 q/ha). This may be due to uneven distribution of plants over the field. In case of seed soaking treatments, 12 hr soaking of seeds in water registered highest grain yield (11.65 q/ha). This was mostly due to increased plant population resulted from 12 hr soaking of seeds over 8 hr and no soaking

Table 1. Yield attributes seed and oil yields and oil content of safflower as influenced by dates of sowing , method of sowing and seed soaking (pooled over 3 years)

Treatment	No. of plants/ m^2	No. of capitula plant	No. of grains/ capitulum	1,000-seed weight (g)	Grain yield (q/ha)	Oil content (%)	Oil yield (kg/ha)
Dates of sowing							
D_1	20.4	19.7	18.1	43.1	12.13	30.61	371.67
D_2	18.4	19.3	16.9	43.0	10.17	30.22	307.49
D_3	13.0	14.4	15.8	42.6	8.73	29.31	256.38
CD (P = 0.05)	0.71	0.92	0.28	0.28	0.43	0.15	22.89
Method of sowing							
M_1	17.3	18.4	17.1	42.9	10.98	30.13	327.70
M_2	17.2	17.2	16.7	42.9	9.86	29.96	296.00
CD (P = 0.05)		0.59	0.21		0.18	0.11	13.44
Seed soaking							
S_1	15.4	17.5	16.8	42.7	9.10	29.93	273.45
S_2	17.7	17.1	17.0	42.1	10.28	30.06	309.68
S_3	19.1	18.8	17.1	43.2	11.65	30.15	352.42
CD (P = 0.05)	0.60	0.36	0.22	1.01	0.28	0.60	18.41

of seeds.

The interaction effects between date of sowing and seed soaking, date of sowing and method of sowing and method of sowing and seed soaking exhibited significant differences in grain yield. The highest grain yield (13.71 q/ha) was registered in the first date of sowing along with 12 hr seed soaking treatment.

Yield attributes

The yield attributing characters exhibited significant difference for different date of sowing, seed soaking and method of sowing treatments (Table 1). The highest number of capitulum/plant (19.71), number of grains/capitulum (18.10) and 1,000-seed weight (43.14 g) were observed in case of first date of sowing treatment. Line sowing was significantly superior to broadcast as regards to number of capitula/plant (18.44) and number of grains/capitulum (17.13). In case of seed soaking treatments, 12 hrs seed soaking registered the highest number of plants/m^2 (19.07). The same treatment was also significantly superior as regards to number of capitula/plant (18.79), number of grains/capitulum (17.07) and 1,000-seed weight (43.20 g).

Oil content and Oil yield

The oil content of safflower seeds and the oil yield were found to be influenced by different treatments. The highest oil percentage was recorded in first sowing date (30.61) which was 1.29% and 4.41% higher than that of 2nd and 3rd date of sowing respectively. Early sowing increased the oil content, due to the effect of high temperature and low soil moisture prevailing at the later stages of capitulum development under late sowing. The results confirm the findings of Ghosh and Chatterjee (1988). Higher oil percentage and oil yield were recorded in case of 12 hr soaking treatment (30.15%, 352.4 kg/ha) than 8 hr and no seed soaking treatment.

REFERENCE

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