The Journal of Rural and Agricultural Research Vol. 21 No. 1, 40-42 (2021)
Received August 2020; Acceptance May 2021

Effect of Phytohormones sprayed at 55th and 70th day's old Sunflower plants on oil content of seed

ADESH KUMAR AND V. K. BHATNAGAR
Dept. of Botany, Hindu (P.G.) College, Moradabad

Abstract

The experiment were conducted at TMIMT farm house, Delhi Road, Pakwara, Moradabad during 2017-18 to study the effects of Cycocel, Gibberellic acid and Ethephon at 10, 25, 50, 100, 200, 400 and 800 mg/l applied 55th and 70 days old sunflower plants, as foliar sprays. Effects on flowering (days to flower and floral morphology), yield components and oil contents and oil quality were also recorded at maturity. The experiments to obtain information on oil accumulation and changes in oil composition in developing sunflower seeds. The present observation can be explained by suggesting that foliar application of Cycocel, Gibberellic acid and Ethephon probably increased the oil content by accelerating the rate of photosynthesis.

Keywords: GA_3, Cycocel, Ethephon, Sunflower plants

Introduction

Oil seed crops occupy a position next only to cereals amongst the major Agriculture crops in the country, both in terms of tonnage and value and occupy a premise position in the national economy. This groups of crops not only provides and essential constituent of human diet but also serves as an important raw material for the Agro-based industries. Oil seed crops are presently cultivated on 19.9 million hectares of total cropped area of 163 million hectares in the country and this constitute about 12% of the total cultivate land. Oil seed production fluctuates from year depending up on the weather and other input conditions like water availability as only 10% of the area under oil seeds is irrigated. Saleem et al., (2003) studied the influence of speech gravity on the seed quality and yield of sunflower seeds. The object of their applications includes of rooting initiation of parthenocarpy, fruit drop and senescence and control of weeds from increased producing of Agriculture and Horticulture crops regulates of flowering by growth hormones of great economic importance in plants as it directly determines the yield (Weaver, 1972).

The aggregate oil seed production has recorded a rise from 9.4 million tons at the beginning of the sixth plan to 13.0 million tons in 1984-85 representing a rise of about 38%. Even the increase in oil seed production, however has failed to meet the ever increasing demand for the vegetable oil in the country. According to an estimate by the study group constituted by the ministry of commerce's and civil supplies, as against the country's total requirement for edible oils of 49 lac tones, the indigenous supply was only 37 lac during 1984-85. Maurya et. al (2003) studied the effect of sieve sizes on the recovery and seed quality of sunflower seed. Phytohormones have been used successfully in many crops to improve seed filling, fruit setting and early flowering (Weaver R.J., 1972). Under dry soil conditions the seed yield and oil content were increased by the application of ccc to the flower head, but under moist condition they were decreased compared with the untreated controls.

Materials and Methods

Mature and healthy plants sprayed by different concentrations of phytohormones namely cycocel, gibberellic acid and ethephon were harvested and seed were obtained. The content of seeds was determined non- destructively by NMR spectroscopy. The fatty seed composition was determined by GLC in the form of their methyl esters.

Extraction of oil

The oven dried seeds (at 60^0 to 70^0 C) was crushed in mortar pestle. The crushed seeds were shaken with chloroform methanol (2 : 1) for 3 to 5 minutes in a separation funnel (The solvent was 20 times of the sample taken).

Results and Discussion

All the three phytohormones showed a significant effect on oil contents of seed on both 55th and 70th days old sunflower plants. No marked effect was observed at lower concentrations in almost all the

used of phytohormones (Table 1). Cycocel and ethephon at all the concentration gradually decreased the oil percentage of seed while increment in oil percentages was noted in seeds of plants treated with gibberellic acid. Maximum percentages were recorded (48.50%) in over control (44.00%). Oil contents was found more in seed of plants sprayed on 70 days in comparison to seeds of plants sprayed at 70 days. Ethrel at oil concentration decreased the oil percentage in seed of both 55th and 70th days plants. Cycocel at all the concentrations showed an increased trend with increasing concentrations. The maximum oil percentages 41.89% and 41.98% was recorded in seed of plant sprayed on 55th days and 70th days respectively. GA_3 did not show any significant effect at lower concentration while higher concentrations of gibberellic acid showed a significant increment in oil content.

The effects of phytohormones (either sprayed at 55th and 70th days) were statistically significant from each other and significant variation was also observed due to increment of hormones and time of spray.

Oil development in sunflower has been reported to very with the stage of seed development. A sharp increase in first few weeks after blooming and a slow increase towards the end of ripening have been reported earlier. The above finding also indicates that the period midway between blooming and finally maturity of seed is the period of intensive oil formation. The control plants yielded seeds with 44 percent oil on 55th day and 45 percent days oil on 70th days is in agreement with the reported oil percent of the seeds of Sunflower (C.V. Peredavik – 49.9%). The slight difference obtained between present investigation and other reported value may be due to environmental affected such as temperature is known to effect oil percentage in sunflower seeds. The oil content from outer, middle and inner rings of different types of head obtained from different sunflower cultivator created variability in head and difference due to seed position was also recorded when highest oil content was observed different types of head from the middle ring position of the head.

The experiments to obtain information on oil accumulation and changes in oil composition in developing sunflower seeds. It was shown that percent of instructed oil increased with the accumulation of oil in seeds. As early as 1963, Pawloskli showed a

Table 1: Effect of Phytohormones Sprayed at 55th and 70th Days old Sunflower Plants on oil Content of Seed

Treatments		Oil Percentage	
Phytohormones	Conc. (ppm)	55th Day	70th Day
Water (Control)	-	44.00	45.06
Cycocel	10	39.32	40.26
	25	39.82	40.65
	50	40.36	40.88
	100	40.73	40.97
	200	40.90	41.00
	400	41.52	41.36
	800	41.98	41.77
Gibberellic Acid	10	45.00	46.24
	25	45.24	46.87
	50	45.82	47.00
	100	46.57	47.35
	200	47.83	47.77
	400	48.56	47.95
	800	48.68	48.00
Ethephon	10	38.70	41.05
	25	38.90	41.26
	50	39.20	41.90
	100	40.56	42.43
	200	41.24	43.00
	400	42.90	43.76
	800	42.06	44.08
SEm±	-	0.53	0.77
CD at 5%	-	1.04	2.33

Table 2: Effect of Phytohormones sprays at 55th and 70th day old sunflower plants head diameter and filling percentage

Treatments		55th day		70th day	
Phytohormones	Conc. (ppm)	Head Diameters	Filling percentage	Head Diameters	Filling percentage
Water (Control)	-	6.65	44.5	9.75	48.33
Cycocel	10	6.50	43.5	7.00	55.36
	25	6.50	48.6	6.90	58.00
	50	6.52	50.2	9.80	60.80
	100	6.52	51.2	6.35	65.58
	200	6.53	51.4	6.30	66.00
	400	6.55	53.2	6.45	67.00
	800	6.55	54.6	6.40	70.00
GA_3	10	6.00	29.1	5.35	34.12
	25	5.95	27.2	5.40	30.70
	50	5.80	20.6	5.55	28.30
	100	5.75	15.2	5.85	24.54
	200	5.74	14.0	5.90	24.00
	400	5.72	13.6	5.95	23.50
	800	5.70	13.0	6.00	23.25
Ethephon	10	6.75	44.0	6.25	66.18
	25	6.70	44.0	6.15	64.10
	50	6.50	44.1	6.00	62.30
	100	6.15	44.3	5.85	60.12
	200	6.20	44.5	5.65	58.00
	400	6.30	44.7	5.50	57.03
	800	6.42	44.9	5.40	56.50
SEm±	-	0.37	5.16	0.57	7.13
CD at 5%	-	0.22	6.50	6.84	22.7

correlation between oil percentage and specific gravity of seeds. It can be discussion that application of GA_3 & Cycocel, Ethephon has great potential for improving the quality and oil content. Ethephon application increased the yield markedly when applied to 70 days plants but the affect was not marginal when applied to 55 days old plants. The difference between the 55 and 70 days treatment were not marked. Percent filling was higher when Ethephon was applied at 55 days. Both increase in head diameter and percentage fitting seen to contribute to the increased yield (Table 2). Percentage of data of the effects of GA_3 at 55 & 70 days reveals the same trend of effect of the final yield being determined by the balance between the effects of these contributing factors.

Conclusion

The yield of sunflower (Helianthus annuus L.) is determined by growth stimulated flowering and seed yield. The used three phytohormones viz. Cycocel, gibberellic acid (GA_3) and Ethephon significantly induced, seed yield, oil content and oil quality. The used of GA_3 found superior followed by Cycocel and Ethephon. Among the concentration, the most of seed yield and its contributing character showed better performance at 400 and 800 mg/l hence, it can be concluded that 800 mg/l of GA_3, 400 mg/l of Cycocel and Ethephon can be recommended for the better seed yield and better oil content and oil quality.

The experimental findings of the present study are of fundamental and horticultural values and could be utilized by the hormones to stimulate oil content and oil quality of sunflower.

References

Maurya, C.L., Singh, R. and Singh P. (2003). Effect of Seive Sizes on the recovery and seed quality of sunflower seeds (Helianthus annuus L.) farm, Sce. J.12.

Saleem, S.I., Swamy, S.N. and Prasad, S.R. (2003). Influence of specific gravity on the seed quality and yield of sunflower seeds. Seed res. 31: 8-12.

Weaver, R.J. (1972). Plant growth substance in Agriculture. W.H. Freeman and company Sanfrancisco, pp. 594.

Travis, L.V. (1973). Effect of gibberellin on some physiological features of sunflower. Bulletin Glavnogo Botanicheskogo Sada (87): 76-79 (Citied from: field crop Abstr. 1975, ref. no. 1117).