



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(6): 1212-1214

© 2018 IJCS

Received: 04-09-2018

Accepted: 08-10-2018

Rahul A Kengare

PG student, M.P.K.V., Rahuri,
Maharashtra, India

Sukhdev K Ransing

Assistant Seed Research Officer,
M.P.K.V., Rahuri, Maharashtra,
India

Chetan K Chavan

PG student, M.P.K.V., Rahuri,
Maharashtra, India

Arvind S Totre

PhD scholar, Department of
Botany, M.P.K.V., Rahuri,
Maharashtra, India

Effect of growth regulators on seed filling in sunflower (*Helianthus annuus* L.) variety Phule Bhaskar during *kharif* season

Rahul A Kengare, Sukhdev K Ransing, Chetan K Chavan and Arvind S Totre

Abstract

A field experiment was conducted during *Kharif*, 2017 at Post Graduate Institute Farm, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar to study the "Effect of growth regulators on seed filling in sunflower variety Phule Bhaskar during *kharif* season".

The experiment was laid out in a randomised block design (RBD) with three replications and eight treatments involving variety Phule Bhaskar and the plant growth regulators *viz.*, T₁ [Control], T₂ [GA₃ (250 ppm)], T₃ [TIBA (240 ppm)], T₄ [NAA (50 ppm)], T₅ [Kinetin (200 ppm)], T₆ [BA (250 ppm)], T₇ [Boron (0.2%)], T₈ [Hand Pollination].

The present study was conceptualized and executed to find out an appropriate growth regulator for seed filling in sunflower (*Helianthus annuus* L.). The foliar sprays of PGR's were given at the time of 50% flowering and seed formation.

In case of head diameter, total number of seeds/head, total number of filled seeds/head, total number of unfilled seeds/head, seed filling percentage, harvest index, yield q/ha and oil content; among all the treatments, Treatment T₇ (0.2% boron) resulted best performance which was significantly superior over control (T₁).

Keywords: sunflower, growth regulator, boron, PGRs, TIBA, kinetin

Introduction

Sunflower (*Helianthus annuus* L.) is the most important oilseed crops of the world because of the adequate concentration of unsaturated fatty acids (900g kg⁻¹) in its oil has gained popularity among all the oilseed crops. The excellent quality of sunflower oil is due to its richness with high degree polyunsaturated fatty acids, anti-cholesterol properties, short duration, wide adaptability to soil and climatic conditions, photo and thermo-insensitiveness, drought tolerance and higher oil yield per unit area. In India, it is cultivated over an area of about 2.4 million hectares with the production of 1.44 million tonnes with productivity of 6.08 q ha⁻¹ as against 12.71 q ha⁻¹ of the world productivity (Rasool *et al.*, 2013) [3].

Sunflower is an important oilseed crop with almost 20-27% protein and 40-47% oil content. It is a wealthy source of vitamins A and D. Its oil is called premium oil due to the presence of oleic acid (16.2%) and linoleic acid (72.5%) with high percentage (60%) polyunsaturated fatty acid. The seed cake of sunflower used for cattle feed which is a good source of protein (Tahir *et al.*, 2014) [4].

Seed setting and filling is one of the most important constraints in sunflower production and often considered to be a major reason for low productivity. Besides poor agronomic management, there are several genetic, physiological and environmental factors causing poor seed setting and filling in sunflower. The sporophyte type of self-incompatibility mechanism is one of the genetic reasons for poor seed setting in sunflower. The physiological mechanisms that regulate seed setting and filling in sunflower are complex (Ram and Davari, 2011) [2].

Plant growth regulators (PGRs) have the capacity to modify every phase of plant growth spanning from seed germination to crop maturity. Since most plant growth and seed development processes are regulated by natural plant hormones, many of these processes might be manipulated either by altering the endogenous hormone level or by changing the capacity of the plant to respond to its natural hormones. It is well known that plant hormones are involved in grain filling and seed development (Al- Jobori, 2012) [1].

Correspondence

Rahul A Kengare

PG student, M.P.K.V., Rahuri,
Maharashtra, India

The present investigation entitled “Effect of growth regulators on seed filling of sunflower during *khariif* season” is undertaken to know the response of sunflower to application of growth regulators *viz.*, GA₃, TIBA, NAA, Kinetin, BA, Boron and hand pollination in relation to seed filling and yield attributes.

Materials and Methods

A field experiment on sunflower was conducted at Post Graduate Institute Farm, Department of Agricultural Botany, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar. The present investigation was undertaken during the *Khariif* season 2017. The experiment was laid out in randomized block design (RBD) with three replications. The variety of sunflower was Phule Bhaskar. Recommended dose of 40:30:30 kg N, P₂O₅, K₂O ha⁻¹ in the form of Urea, DAP and muriate of potash was applied to the soil as basal dose. The seeds were sown on 14th July, 2017 at spacing of 60×30 cm. The irrigation was given at whenever necessary. The recommended cultural operations and plant protection measures were carried out timely. The foliar sprays of PGR's were given at the time of 50% flowering and seed formation.

Results and Discussion

1. Total number of filled seeds/head

The significantly highest total number of filled seeds/head (1648.67) was observed in treatment T₇ (0.2% boron) over control (1143.33).

2. Total number of unfilled seeds/head

The results indicated that significant difference was observed among the treatments. Number of unfilled seeds was significantly lower (184.33) in treatment T₇ (0.2% boron). However, significantly highest (307) number of unfilled seeds was observed in treatment T₁ (control).

3. Total number of seeds/head

The data revealed that the highest number of seeds per head (1833.00) was observed in treatment T₇ (0.2% boron). While, the lowest number of seeds per head (1450.33) was recorded in treatment T₁ (control). For determining the yield potential of the sunflower crop, the number of seeds per head is an important yield component. Translocation of assimilates from

source to sink, which ultimately increased number of seeds per head.

4. Seed Filling Percentage (%)

The significantly higher seed filling percentage (%) was observed in treatment T₇ (0.2% boron) (89.95%) which was significantly superior over rest of the treatments.

5. Head Diameter (cm)

The significantly highest head diameter (17.66 cm) was observed in treatment T₇ (0.2% boron), while, the lowest head diameter (15.15 cm) was observed in treatment T₁ (control). Head diameter is an important yield component of sunflower. It is more or less genetically controlled character, but also influenced by the plant growth regulators and environment in which the plant is grown. The stimulatory effect of boron on sunflower plant may be due to its role in enhancing metabolic process and improving development of pollen tube.

6. Yield q/ha

The result indicated that the significant difference observed among all the treatments for seed yield/ha. The treatment T₇ (0.2% boron) recorded significantly highest yield (23.84 q/ha) over rest of the treatments. However, significantly lowest seed yield (17.18 q/ha) was observed in treatment T₁ (control). Sufficient source, a strong sink and better translocation between these two are essential for higher seed setting and yield of sunflower. The process of seed setting occurs in a short period after pollination and fertilization.

7. Harvest Index (%)

Significantly highest harvest index was recorded (45.26%) in treatment T₇ (0.2% boron) which was significantly superior over rest of the treatments. Harvest index is a measure of determining productivity of a crop.

8. Oil Content (%)

The data revealed that the significantly highest oil content (38.87%) was recorded in treatment T₇ (0.2% boron) which was significantly superior over rest of the treatments, however the lowest oil content (36.50%) was recorded in treatment T₁ (control). This might be due to after pollination and seed set, the formation of protein start and there after oil synthesis start.

Table 1: Filled, unfilled, total number of seeds/head and seed filling percentage of sunflower variety Phule Bhaskar as influenced by PGRs (Plant Growth Regulators)

Sr. No.	Treatments	Filled seeds/head	Unfilled seeds/head	Total number of seeds/head	Seed filling percentage
T ₁	Control	1143.33	307.00	1450.33	78.84
T ₂	GA ₃ (250 ppm)	1272.33	294.33	1566.67	81.21
T ₃	TIBA (240 ppm)	1470.33	241.67	1712.00	85.93
T ₄	NAA (50 ppm)	1454.67	285.67	1740.33	83.59
T ₅	Kinetin (200 ppm)	1522.00	231.33	1753.33	86.81
T ₆	BA (250 ppm)	1337.00	239.67	1576.67	84.80
T ₇	Boron (0.2%)	1648.67	184.33	1833.00	89.95
T ₈	Hand Pollination	1541.00	231.67	1772.67	86.93
	SE(±)	9.22	13.24	13.37	0.71
	CD @5%	27.95	40.15	40.54	2.15

Table 2: Head diameter, yield ha⁻¹, harvest index and oil content of sunflower variety Phule Bhaskar as influenced by PGRs (Plant growth regulators)

Sr. No.	Treatments	Head diameter (cm)	Yield q/ha	Harvest Index (%)	Oil content (%)
T ₁	Control	15.15	17.18	41.73	36.50
T ₂	GA ₃ (250 ppm)	16.96	19.32	42.98	37.42
T ₃	TIBA (240 ppm)	17.26	22.10	44.15	38.71
T ₄	NAA (50 ppm)	16.97	21.00	43.93	38.10
T ₅	Kinetin (200 ppm)	17.43	23.15	44.84	38.60

T ₆	BA (250 ppm)	16.81	20.54	43.67	37.80
T ₇	Boron (0.2%)	17.66	23.84	45.26	38.87
T ₈	Hand Pollination	17.51	19.73	45.16	37.51
	SE(+)	0.05	0.33	0.71	0.17
	CD @5%	0.16	1.00	2.15	0.51

References

1. Al-Jobori KMM. Evaluation of the role of Gibberellin and Cytokinin in Regulation of Seed Setting and Seed Filling in Sunflower plant (*Helianthus annuus* L.). Diyala Journal of Pure Sciences. 2012; 8(4):60-79.
2. Ram M, Davari MR. Seed setting and filling problem in sunflower and its management-A review. International journal of Agronomy and Plant Production. 2011; 2(2):33-56.
3. Rasool FU, Hassan B, Jahangir IA. Growth and yield of sunflower (*Helianthus annuus* L.) as influenced by nitrogen, sulphur and farmyard manure under temperate conditions. SAARC J Agri. 2013; 11(1):81-89.
4. Tahir M, YounasIshaq M, Sheikh AA, Naeem M, Rehman A. Effect of boron on yield and quality of sunflower under agro-ecological conditions of Faisalabad (Pakistan). Sci. Agri. 2014; 7(1):19-24.