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To know the effect of foliar application of thiourea and potassium nitrate on physiological growth at different stages of sesame (*Sesame indicum* L.)

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Abstract

An experiment "To know the effect of foliar application of thiourea and Potassium nitrate on Physiological growth at different stages of Sesame (*Sesame indicum* L.)" was conducted behind the wire net house of Department of Crop Physiology, C.S. Azad University of Agriculture and Technology, Kanpur (208002). To study the response on Sesame of thiourea and Potassium nitrate along with foliar application at two spray (55 DAS and 70 DAS) during Kharif season 2015. Crop under foliar application of thiourea and KNO_3 attained maximum growth, chlorophyll intensity and dry matter accumulation in plant parts. It resulted in significantly improved productivity over other treatment KNO_3 which were also found superior over thiourea also found better than control growth parameters viz. plant height, number of leaves, number of branches, leaf area and dry matter production of (stem, leaves, pod) in (g) and growth analysis parameter these were RGR (Relative Growth Rate), NAR (Net Assimilation Rate), LAD (Leaf Area Duration), dry matter accumulation per day per plant (g) and yield attributes number of capsules per plant, number of seed per capsule test weight of (1000 seeds) in (g), seed yield, biological yield per plant as well as metabolic activity chlorophyll intensity percent over control among the application of thiourea 0.05% and KNO_3 1% along both recorded maximum improvement to control but the KNO_3 is recorded maximum improvement in all these parameters followed by thiourea.

Keywords: effect, physiological, potassium nitrate, thiourea

Introduction

The sesame is one of the most ancient cultured oil plants. The seed contain 50 to 52 % of fatty non- drying oil, 18 to 20 % protein, 15.6 to 17.5% carbohydrate. It has no odour and after refining, becomes straw like in colour, and very good in taste. Sesame oil is widely employed for production of margarine, canned as well as in the soap and confectionery industries. After burning, sesame oil yields top quality black ink.

Sesame is believed to be a native of South Africa, mostly cultivated in tropics and subtropics so, cultivated in countries of Asia, Africa but less popular in USA. In India it is mostly grown in U.P., Rajasthan, Andhra Pradesh, Orissa, Gujarat, Tamil Nadu and Karnataka West Bengal have maximum yield per hectare and U. P., have maximum area.

Materials and Methods

Materials and methods followed during the present investigation entitled 'To know the effect of foliar application of thiourea and Potassium nitrate on Physiological growth at different stages of Sesame (*Sesame indicum* L.) under moisture stress environment' during kharif season of year 2015 described as below:-

Experimental site

The Experiment was conducted behind the wire net house of department of crop Physiology, C.S.A. University Kanpur during kharif season 2015.

Climate and topography

C.S. Azad university of agriculture and technology Kanpur is situated in central Uttar Pradesh at $26^{\circ}28'$ north (latitude) on $80^{\circ}24'$ at (longitude) at an altitude of 125m above the mean sea level it has a semi-arid climate and rain fall 762 mm which is mostly received from south west monsoon from last June to middle of October and frequent showers are received from north east monsoon during winter season the weather condition for the current experimental season are given in table.

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Table 1: climate condition during the experimental season (June-2015 to Dec.-2015)

Months	Temperature (°C)		Rainfall (mm)	Relative humidity (%)	
	Max.	Min.		Max	Min
June -2015	43.0	23.4	106.53	83.3	29.4
July -2015	36.3	23.1	142.70	88.0	55.0
Aug.-2015	34.3	22.9	250.27	88.6	61.7
Sept. -2015	37.0	19.5	126.10	87.9	44.0
Oct. -2015	35.8	14.5	30.70	87.9	50.0
Nov. -2015	30.5	8.8	21.70	93.9	46.4
Dec. -2015	28.2	1.8	10.00	94.0	36.7

Experimental details

Experiment: To know the effect of foliar application of thiourea and Potassium nitrate on Physiological growth at different stages of Sesame

Experimental design: Randomized block design

Variety: Tarun

Treatment

T₁ Control

T₂ 0.05% Thiourea foliar application at 50 % flowering.

T₃ 0.05% Thiourea foliar application at 50 % capsule filling.

T₄ 0.05% Thiourea foliar application at 50% flowering + 50% capsule filling.

T₅ 1.0% Potassium nitrate foliar application at 50 % flowering.

T₆ 1.0% Potassium nitrate foliar application at 50% capsule filling.

T₇ 1.0% Potassium nitrate foliar application at 50% flowering + 50 % capsule filling.

Application of fertilizer

30 kg N₂+ 15 kg P₂O₅+15 kg K₂O per hectare. All plots received a uniform basal dressing of 15 kg/ha each of nitrogen phosphorus and potash. Urea, DAP and MOP were used as carriers of nitrogen, phosphorus and potash respectively. The phosphetic and potassium fertilizers were applied before sowing while the basal dose of nitrogen fertilizer was broadcasted uniformly on the soil surface just prior to sowing of seeds. Rest of nitrogen (15 kg n/ha) was applied at 30 days stage. In all the treatments quantity of fertilizer per plot was calculated on the assumption that 2.3 cm depth of soil weight 3 million kg/ha.

Seed materials

Til variety Tarun used in this experiment was obtained from economic botanist oil seed, C.S.A. University of Agriculture and Technology, Kanpur.

Preparation of field and sowing of seeds

To obtain better and uniform germination, pre sowing irrigation was given out to the selected field. Field was prepared to 3 tilth by deep ploughing. Sowing was done at 45 cm row spacing by Kera method (behind Deshi plough) in furrow at 3-5 cm deep on the basis of 3 kg/ha recommended seed. Plant to plant distance was maintained 15 cm through thinning after 20 days of sowing.

Experimental finding**Table 1:** Plant height (cm) as influenced by foliar spraying of thiourea and Potassium nitrate on Sesame.

Treat.	Nutrients applied stages	Plant height (cm)			
		40 DAS	60 DAS	80 DAS	At maturity
		I	II	III	IV
T ₁	Control	67.66	117.66	121.33	123.99
T ₂	0.05% Thiourea foliar application at 50 % flowering.	72.66	120.66	138.33	140.49
T ₃	0.05% Thiourea foliar application at 50 % capsule formation.	74.33	132.33	146.00	147.61
T ₄	0.05% Thiourea foliar application at 50 % flowering + 50 % at capsule formation.	84.33	144.33	153.33	154.61
T ₅	1.0% Potassium nitrate foliar application at 50 % flowering.	76.66	132.33	145.00	146.57
T ₆	1.0% Potassium nitrate foliar application at 50 % capsule formation.	83.33	136.66	143.66	146.18
T ₇	1.0% Potassium nitrate foliar application at 50 % flowering + 50 % capsule formation.	90.00	151.00	162.33	164.66
	MEAN	78.42	133.56	144.28	146.30
	S. E. (d) ±	2.44	2.57	1.81	2.32
	C. D. (5%)	5.32	5.61	3.94	5.06
	CV (%)	3.81	2.36	1.53	1.94

Plant height

Foliar application of Thiourea and Potassium nitrate significantly influenced the plant height (table-I) of Sesame at 40 DAS at this stage no spray. At 60 DAS both doses of Thiourea and Potassium nitrate influence the plant height and treatments were significantly superior over control. At 80

DAS & maturity at this stage crop growth significantly maximum height was obtained by foliar application of thiourea (0.05%) and Potassium nitrate (1.0 %) compression of plant height both doses Potassium nitrate followed by thiourea significance all these treatments provided there effectively on plant height.

Table 2: Effect of foliar application of Thiourea and Potassium nitrate on production of leaves per plant of Sesame.

Treat.	Nutrients applied stages	Number of leaves per plant		
		40 DAS	60 DAS	80 DAS
		I	II	III
T ₁	Control	16.00	43.33	60.33
T ₂	0.05% Thiourea foliar application at 50 % flowering.	18.66	52.66	63.66
T ₃	0.05% Thiourea foliar application at 50 % capsule formation.	23.00	68.33	76.33
T ₄	0.05% Thiourea foliar application at 50 % flowering + 50 % at capsule formation.	25.33	84.33	87.00
T ₅	1.0% Potassium nitrate foliar application at 50 % flowering.	20.00	70.00	79.00
T ₆	1.0% Potassium nitrate foliar application at 50 % capsule formation.	24.00	74.66	86.00

T ₇	1.0% Potassium nitrate foliar application at 50 % flowering + 50 % capsule formation.	30.00	91.00	94.66
	MEAN	22.42	69.18	78.14
	S. E. (d) ±	1.73	1.68	2.10
	C. D. (5%)	3.76	3.67	4.59
	CV (%)	9.44	2.98	3.30

Number of leaves per plant

Data was recorded on number of leaves per plant at different stages which at 40 DAS, 60 DAS and 80 DAS were display in Table 2. Overall average of number of leaves increased in all treatments than controls as stages advanced. Regarding at 60 DAS thiourea and Potassium nitrate with different concentrate were significantly superior to control. Individually, thiourea and Potassium nitrate both, increase number of leaves than control, viz. T₄ and T₇ superior but Potassium nitrate is highest followed by thiourea.

At 80 DAS were not found higher difference between individual treatments, they were significantly superior to control. It some observation was recorded at 80 DAS stage.

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