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Research Article

Influence of Seed Pelleting on Crop Growth and Seed Yield in Sunflower Hybrid Seed Production of KBSH-53(*Helianthus annus L.*)

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Abstract

A field experiment was conducted to study the Influence of seed pelleting on crop growth, seed yield in sunflower hybrid KBSH-53(*Helianthus annus L.*) at Department of Seed Science and Technology, UAS, GKVK. Bangalore during kharif 2012 with three replication and sixteen treatment combinations. The results indicated that the growth parameters like plant height at 30, 60, 90 DAS (16.29 cm, 131.74 cm, 151.94 cm) and head diameter at harvest (17.78 cm),were significantly higher with seed pelleted with zinc sulphate(2%) over control and other treatments.The yield parameters like number of filled seed per capitulum (547.55), less number of unfilled seed per capitulum(50.14),seed filling(91.57 %),seed recovery(89.49 %),seed yield per plant(33.55 g),seed yield per plot(487.33 g),graded seed yield per plot(436.15 g) and seed yield (13.53 q/ha) were significantly higher with seed pelleted zinc sulphate(2%) over control and other treatments.

Keywords: sunflower, micronutrients, bio fertilizers and botanicals.

INTRODUCTION

Sunflower (*Helianthus annus L.*) is an annual plant grown as a crop for its edible oil. Sunflower is originated from southern parts of USA and Mexico. In world it is cultivated on area of 18.12 million hectares with an annual production and productivity of 22.03 million tonnes and 1216 kg per hectare, respectively (Anon.2012).India has emerged as second major sunflower producing country recently in Asia followed by china. In India, it is being grown in about 0.9 million hectares with annual production of 0.65 million tonnes and productivity of 696 kg per hectare (Anon, 2012).

High quality seed is indication of healthy crop stand it enhances productivity of the crops. Because of high rate of outcrossing in sunflower seed production task is very difficult and larger crop isolation distance is needed to maintain genetic purity of the seed crop.

The causes like self-incompatibility, absence of pollen vectors, insufficient nutrient supply to the sink, moisture stress etc. are responsible for poor seed set in sunflower.To promote good seedling establishment, to minimize yield loss, to maintain and improve quality and to avoid the spread of biotic stresses seeds are treated with micro and macro nutrients,fungicides,insecticides and botanicals besides seed pelleting.

Seed pelleting is the process helps to improves the percent of germination and seedling establishment under field conditionsand protect the seed from biotic stresses finally establishes good healthy crop finally it ends up with high crop productivity.

With this background the present investigation entitled *"influence of seed pelleting on crop growth, seed yield in sunflower (Helianthus annus L.) Hybrid KBSH-53"* is undertaken.

MATERIAL AND METHODS

The sunflower crop was raised during Kharif, 2012 (August, 2012 to December, 2012) at plot E-6 of Department of Seed Science and Technology, UAS, GKVK. Bangalore, which is situated at 12º 15′ North latitude and 77º 35′ East longitude and at an altitude of 930 meter above the mean sea level. There were sixteen treatments laid out in factorial randomized block design with three replications. The treatments combinations includes

T_1B_1= Zinc sulphate (2%) + without botanicals and bio fertilizers, **T_1B_2**= Zinc sulphate (2%) +Ash (80g/kg of seed), **T_1B_3**= Zinc sulphate (2%) + Garlic paste (100g/kg of seed),**T_1B_4**= Zinc sulphate (2%) +Azotobacter (150g/kg of seed),**T_1B_5**= Zinc sulphate (2%) +Trichoderma viridae (6g/kg of seed),**T_2B_1**= Boron (0.5%) + without botanicals and bio fertilizers,**T_2B_2**= Boron (0.5%) + Ash (80g/kg of seed),**T_2B_3**= Boron (0.5%) + Garlic paste (100g/kg of seed).,**T_2B_4**= Boron (0.5%) + Azotobacter (150g/kg of seed),**T_2B_5**= Boron (0.5%) +trichoderma viridae (6g/kg of seed),**T_3B_1**= Gouch (3g per kg of seed) + without botanicals and biofertilizers,**T_3B_2**= Gouch (3g per kg of seed) +Ash (80g/kg of seed),**T_3B_3**= Gouch (3g per kg of seed) +Garlic paste (100g/kg of seed).,**T_3B_4**= Gouch (3g per kg of seed) + Azotobacter (150g/kg of seed),**T_3B_5**= Gouch (3g per kg of seed) +Trichoderma viridae (6g/kg of seed),**T_{16}**= Control.

RESULTS AND DISCUSSION

Influence of seed pelleted chemical treatment on crop growth and seed yield of sunflower hybrid KBSH-53

Oilseed crop such as sunflower has been found to respond to the application of micronutrients under favorable conditions due to its additive effect on growth and yield attributes. In the present investigation the growth attributes like plant height was significantly influenced due to its application of micronutrients at various stages.

However, significant differences in plant height (Table no.1) were observed at 30 DAS, 60DAS and 90 DAS among the treatments. Increase in plant height was noticed till the end of growth period due to zinc sulphate, Boron, and Gouch and botanicals application. Seed pelleted with zinc sulphate recorded highest plant height (16.29 cm) at 30 DAS, 60 DAS (131.74 cm) and 90 DAS (151.94 cm) as compared to other treatments and control (12.31cm,119.85cm.135.12 cm) respectively.[3,5,7].This is because of zinc sulphate played important role in better crop growth. Besides it enhances the uptake of nitrogen and phosphorus by plants and increased synthesis of protein, RNA and decrease in free amino acid and proline in plants.

The seed pelleted with zinc sulphate recorded significantly (Table no 1) highest head diameter (17.78 cm) compared to other treatment and control (un pelleted seeds) recorded the lowest head diameter (14.78 cm).This could be due to efficient metabolism and translocation of carbohydrates.

The seed pelleted with zinc sulphate recorded significantly on number of filled seeds (547.55), reduced the number of unfilled seeds per capitulum (50.14) and thereby increasing seed filling percentage (91.57 %), seed recovery percentage(89.49%) over control(460.12, 58.88 and 88.62 %, 81.68 %) respectively(Table 1 and 2). This could be due to increase in photosynthetic intensity, constituents of chloroplasts, might have contributed in greater assimilates leading to the higher number of filled seeds and seed filling percentage, seed recovery percentage.[1]

The seed yield per plant, seed yield per plot and seed yield (quintal /ha) also varied significantly among the treatments (Table no 2). Among these treatments seed pelleted zinc sulphate recorded highest seed yield per plant (33.55 g), seed yield per plot (487.33 g/plot) and seed yield (13.53 q/ha) over control(23.79 g, 373.69 g and 10.38 q/ha_{-1}).This may be due to the initiation of mitochondrial activity, leaching of the toxic materials and increased metabolic activity, and also due to the increased Head diameter, seed filling percentage.[4,2]

Influence of botanicals and interaction effects of seed pelleting with chemicals and botanicals.

Among the botanicals treatments, botanicals showed non-significant difference on plant height. Among botanicals without botanicals shows very good plant height followed by seed pelleted with ash, garlic paste and Azotobacter over control.

Among Interaction effects, seed pelleted with chemicals and botanicals did not differ significantly on plant height. Among interaction effects, the seed pelleted with zinc sulphate without botanicals (T_1B_1) gave highest plant height followed by $znso_4$ with ash and $znS0_4$ with garlic paste, boron without botanicals.

Among the botanicals treatments, botanicals showed non-significant difference on head diameter, number of filled seeds, total number of seeds, seed filling percentage, seed recovery percentage and seed yield per plant, seed yield per plot and seed yield(quintal/ha) .

Among Interaction effects, seed pelleting with chemicals and botanicals did not differ significantly on Head diameter, Number of filled seeds, Total number of seeds, seed filling percentage, seed

recovery percentage and seed yield per plant, seed yield per plot and seed yield(quintal/ha) .

CONCLUSION

In the present investigation application of micronutrients like Zinc Sulphate, Boron and Gouch and Botanicals in the form of seed pelleting in Sunflower influences the crop growth and development throughout the life cycle. It is noticed that application of Zinc sulphate in sunflower through seed pelleting increases crop growth and also yield components like seed yield per plant, seed yield per plot and seed yield/ha.

Table 1: Influence of seed pelleting on growth attributing characters of Sunflower F_1 hybrid-KBSH-53

Treatments	Plant height(cm) 30 DAS	60 DAS	90 DAS	Capitulum diameter(cm)	Number of filled seed per capitulum	Number of unfilled seed per capitulum
Chemicals (T)						
T_1: Zinc sulphate (2%),	16.29	131.74	151.94	17.78	547.55	50.14
T_2: Boron (0.5%),	14.98	126.61	144.03	16.62	515.91	52.56
T_3: Gouch (5g per kg of seed)	14.90	125.98	143.64	16.30	512.13	54.07
S Em±	**0.34**	**1.71**	**2.24**	**0.42**	**10.49**	**0.95**
CD (P=0.05)	**1.00**	**4.94**	**6.48**	**1.23**	**30.32**	**2.74**
Botanicals and bio fertilizers (B)						
B_1: Without botanicals,	16.11	128.53	147.95	17.98	541.36	50.43
B_2: Ash (80 g per kg of seed),	15.16	127.40	147.54	16.52	520.49	52.75
B_3: Garlic paste (100 g per kg of seed)	15.19	129.05	145.31	16.33	531.73	51.50
B_4: Azotobacter (150 g per kg 0f seed)	14.85	127.05	145.42	16.87	510.56	53.54
B_5: Trichoderma viridae (6 g per kg of seed)	15.59	128.53	146.93	16.80	521.85	53.07
S Em±	**0.45**	**2.20**	**2.89**	**0.55**	**13.55**	**1.22**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Interactions (TXB)						
T_1B_1	16.76	134.51	156.94	19.21	584.52	45.30
T_1B_2	16.10	129.31	154.79	17.36	535.45	50.90
T_1B_3	16.35	132.88	147.82	17.22	571.79	47.10
T_1B_4	15.70	129.45	148.12	18.21	515.39	53.30
T_1B_5	16.56	132.55	152.06	16.95	530.64	54.12
T_2B_1	15.44	126.12	141.04	17.56	536.79	48.88
T_2B_2	14.82	125.12	142.83	17.03	496.79	51.90
T_2B_3	15.14	129.33	146.19	15.06	513.42	53.10
T_2B_4	14.71	125.93	143.95	16.92	500.08	55.12
T_2B_5	14.81	126.60	146.15	16.55	532.48	53.80
T_3B_1	16.15	124.96	144.50	17.19	502.79	57.12
T_3B_2	14.59	127.79	145.03	15.17	529.24	55.45
T_3B_3	14.11	124.96	141.92	16.73	509.99	54.30
T_3B_4	14.25	125.79	144.19	15.50	516.21	52.20
T_3B_5	15.42	126.45	142.59	16.92	502.45	51.30
S Em±	**0.77**	**3.82**	**2.89**	**0.95**	**23.47**	**2.12**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Control (un pelleted)	12.31	119.85	135.12	14.78	460.12	58.88
CV (%)	**8.88**	**5.19**	**5.96**	**9.88**	**7.80**	**6.99**

Table 2: Influence of seed pelleting on yield parameters of Sunflower F_1 hybrid-KBSH-53

Treatments	Seed filling (%)	Seed recovery (%)	Seed yield per plant(g)	Seed yield per plot(g)	Seed yield (q/ha)
Chemicals (T)					
T_1: Zinc sulphate (2%),	91.57	89.49	33.53	487.33	13.53
T_2: Boron (0.5%),	90.74	86.09	30.41	470.70	13.06
T_3: Gouch (5g per kg of seed)	90.44	85.91	28.89	425.82	11.82
S Em±	**1.24**	**1.20**	**1.28**	**17.30**	**0.45**
CD (P=0.05)	**NS**	**3.49**	**3.71**	**49.97**	**1.32**
Botanicals and bio fertilizers (B)					
B_1: Without botanicals,	91.41	87.45	31.74	480.90	13.35
B_2: Ash (80 g per kg of seed),	90.78	86.01	29.93	487.40	13.53
B_3: Garlic paste (100 g per kg of seed)	91.12	86.59	31.07	438.79	12.18
B_4: Azotobacter (150 g per kg 0f seed)	90.50	87.10	30.34	442.53	12.29
B_5: Trichoderma viridae (6 g per kg of seed)	90.76	87.32	31.36	456.78	12.68
S Em±	**1.60**	**1.56**	**1.66**	**22.33**	**0.59**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**
Interactions (TXB)					
T_1B_1	92.80	92.61	35.91	529.35	14.70
T_1B_2	91.31	89.25	31.42	504.47	14.01
T_1B_3	92.38	89.68	33.51	460.78	12.79
T_1B_4	90.62	88.53	32.91	461.93	12.83
T_1B_5	90.74	89.70	34.01	480.12	13.33
T_2B_1	91.66	85.74	30.44	475.12	13.19
T_2B_2	90.54	84.19	27.79	488.46	13.56
T_2B_3	90.62	87.22	30.10	477.55	13.26
T_2B_4	90.08	87.83	32.21	483.68	13.43
T_2B_5	90.82	86.36	31.52	428.69	11.89
T_3B_1	89.79	85.99	28.87	438.25	12.17
T_3B_2	90.51	87.63	30.59	469.28	13.03
T_3B_3	90.37	82.93	29.61	378.06	11.50
T_3B_4	90.81	85.26	25.93	382.00	12.10
T_3B_5	90.74	87.78	29.45	461.54	12.83
S Em±	**2.78**	**2.70**	**2.87**	**38.68**	**1.02**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**
Control (un pelleted)	88.62	81.68	23.79	373.69	10.38
CV (%)	**5.31**	**5.39**	**16.33**	**14.70**	**14.05**

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