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Effect of Rapeseed Husk as Bio-Fertilizer on Sugar Beet Crop

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Abstract

Under the name of Rapeseed and mustard, several oil seeds belonging to cruciferae are growth in India. They are generally divided in two groups-

i). Brown mustard
ii). Sarson

In trade Sarson, toria and taramira are known as rapeseed. The Effect of Rapeseed husk as bio-fertilizer on sugar beet crop in saline soil and healthy soil was studied under different parameters like Germination, Shoot Growth, Leaf Area, Biomass and bulb weight of sugar beet. Rapeseed husk is a good amendment for agriculture practices in salinity affected areas and gives excellent results in optimum proportions. Germination counts were made daily for a period of two weeks as per standard procedure for the sown seeds under natural condition. It is noted that Germination status of the sugar beets seeds is improved remarkably in the presence of mustard husk. The shoot growth of the plant was measured from soil surface to the apex of the plant in cm as per standard procedure. The growth of plant leaf area was measured with the help of graph paper for a countable growth change. Cropyield was measured on the basis of total biomass and bulb weight. Immediately after uprooting plants were freed the adhering soil and weighted in counter balance with leaves (biomass) and without leaves (bulb weight).

Keywords: Brown mustard, yellow sarson, brown sarson, rapeseed, rai nitogen, phosphoric acid, potash, germination, shoot growth

Introduction

Under the names rapeseed and mustard, several oilseeds belonging to the cruciferae are growth in India. They are generally divided into two groups.

i). Brown mustard
ii). Sarson
   a) Yellow
   b) Brown

In trade, sarson, toria and taramira are known as rapeseed, and rai as mustard. The crop is grown both in subtropical and tropical countries. In Asia, it is chiefly grown in China, India and Pakistan. India occupies the first position, both with regard to average production of rapeseed and mustard in the world. In India, the brassica crops occupy the second largest position after groundnut, with the more than 3.5 million hectares, producing about more than 2 million tons of seed annually. The chief states producing them are Utter Pradesh, Punjab, Haryana, Assam, Bihar, Madhya Pradesh, Rajasthan, West Bengal and Orissa.

Rajasthan is a dessert state with semi-arid conditions and is ideal for mustard cultivation over 40% of Indian mustard production is grown in Rajasthan, especially in Alwar, Bharatpur, Sri Ganganagar, Sawai Madhopur and Tonk Districts.

Mustard grain to Biomass ratio is 1:1.5 times. Mustard yields the most important edible oil. The aid content of the seeds of different forms ranges from 30 to 48 percent. The oil obtained is the main cooking medium in northern India and cannot be easily replaced by any other edible oil. The oil cake is mostly used as a cattle feed, the leaves of young plants are used as a greens vegetable and cattle feed. Crop residue or straw is used as fuel in Household.

Table 1: The percentage contents of Mustard husk

Nitrogen (N)	Phosphoric acid P205	Potash K2O
0.4-1.5	0.3-0.9	0.3-1.5

The mustard husk was collected from local farms stored openly. One year old husk (in the form of half decomposed) was used after drying and crushing for the experimental soil. The amount of mustard Husk was calculated on the basis of Nitrogen percent in it. Afer calculation the x concentration, 2x, 3x, 4x, and 5x Concentrations were made, and applied each with three replicates.

- Mustard husk is widely used for fuel and for the preparation of combustion coal for industrial purpose, It is also a source of sulphur for the soil fertility.
- Traditionally it is used as farmed manure for soil fertility and in some arcas it is also used as cattle feed

Experiments

Germination: Germination counts were made daily for a period of two weeks as per standard procedure for the sown seeds under natural conditions. Results are shown in Table: 1.

Shoot Growth: On germination cultivated plants per pot were thinned and only a healthy plant was retained per pot for further studies. The shot growth of the plant was measured

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from soil surface to the apex of the plant in centimeters as per standard procedures. Results are shown in Table: 2.

Leaf Area: To observe the growth of plant, leaf area was measured with the help of graph paper for a countable growth change; leaf area was measured two times in the period of crop, marked as primary growth.

Results

Biomass and Bulb Weight: Crop yield was measured on the basis of total biomass (bulb and fodder) and bulb weight. Immediately after uprooting plants were freed the adhering soil and weighted in counter balance, with leaves (biomass) and without leaves (bulb weight). Results are shown in Table: 5.

Table 2: Impact of Mustard husk on germination of Sugar beet

S. No	Concentration of amendments	% Germination							
		After 7 days				After 14 days			
		Pot no.			Average	Pot no.			Average
		1	2	3		1	2	3	
1(i)	0 (in H.S)	-	-	10	3.3	10	20	80	36.5
(ii)	0 (in S.S)	-	-	-	-	40	50	20	36.66
2	X (in S.S)	30	30	25	28.33	100	100	80	93.33
3	2x (in S.S)	25	30	35	30	100	100	100	100
4	3x (in S.S)	40	50	20	30	100	90	75	88.33
5	4x (in S.S)	20	5	15	13.33	75	20	60	51.66
6	5x (in S.S)	10	20	20	16.66	40	80	80	66.66

S.S = Saline Soil H.S = Healthy Soil x = 112.21 gm

Table 3: Impact of Mustard husk on shoot growth of Sugar beet

S. No	Concentration of amendments	%Germination							
		After 7 days				After 14 days			
		Pot No.			Average	Pot No.			Average
		1	2	3		1	2	3	
1(i)	0 (in H.S)	1	1.3	2.5	1.6	5	10	14	9.7
(ii)	0 (in S.S)	1.5	1.5	1.5	1.5	10	9	9	9.3
2	X (in S.S)	2	1.5	2	1.8	8	10.5	13.8	10.8
3	2x (in S.S)	2	1.5	4.5	2.6	10	11	16	12.3
4	3x (in S.S)	1	1	1	1	3	6	5.5	4.8
5	4x (in S.S)	0.5	1.5	1.5	1.2	-	7	3	3.3
6	5x (in S.S)	1	2	1.5	1.5	3	5	6	4.7

S.S = Saline Soil H.S = Healthy Soil x = 112.21gm

Table 4: Impact of Mustard husk on leaf area of Sugar beet

S. No	Concentration of amendments	%Germination							
		Primary Growth				Final Growth			
		Pot no.			Average	Pot no.			Average
		1	2	3		1	2	3	
1(i)	0 (in H.S)	77	70	78	75	77	68	72	72.33
(ii)	0 (in S.S)	13	-	19	10.66	55	-	62	39
2	X (in S.S)	75	200	63	112.66	302	446	205	317.66
3	2x (in S.S)	50	47	163	86.66	167	142	366	225
4	3x (in S.S)	33	90	60	61	101	226	123	150
5	4x (in S.S)	15	76	-	63.66	111	186	-	99
6	5x (in S.S)	26	66	20	37.33	81	96	93	90

S.S = Saline Soil H.S = Healthy Soil x = 112.21 gm

Table 5: Impact of Mustard husk on biomass and bulb-weight of Sugar beet

S. No	Concentration of amendments	Bulb weight (in gms)							
		Pot no.			Average	Pot no.			Average
		1	2	3		1	2	3	
1(i)	0 (in H.S)	200	250	150	200	180	230	130	180
(ii)	0 (in S.S)	100	50	20	66.66	90	40	40	56.66
2	X (in S.S)	600	1800	420	940	430	1400	360	730
3	2x (in S.S)	500	400	1000	633.33	400	350	800	516.66
4	3x (in S.S)	200	230	900	443.33	180	210	800	396.66
5	4x (in S.S)	150	400	300	282.33	120	350	280	250
6	5x (in S.S)	350	500	220	356.66	300	450	200	316.66

S.S = Saline Soil H.S = Healthy Soil x = 112.21gm

Discussion

Impacts of Mustard husk powder mixed in saline solids in different proportions (Integral multiples of x) on germination are summarized in the Table:1. The same table also reveals the trends in germination in healthy soil without amendments for the sake of comparison. It is noted that dormancy termination or germination status of the sugar beet seeds is improved remarkably in the presence of mustard husk. Initially percentage of the seeds germinated increases up to 100%. In presence of optimum amounts of the amendment (about 2x), impact is quite encouraging, About 165% more than the observed values of germination status in case of healthy soils are attributable to the catalytic affect of the amendment. Incorporation beyond this optimum value (about 2x) does not favor the germination status. Rather it is lowered slightly due to the decreasing soil contents and increasing fibrous/non-nutritive contents in the pot. This trend is stabilized at or beyond 4x amounts of the amendment. It appears that a sort of steady State is raised in soil, secd and humidity interactions. Anyhow itis established beyond any shade of doubt that mustard husk improves germination status of the sugar beet seeds even in salinity-affected situations.

The Table:2 summarizes the impact of mustard husk, used as an amendment in varying proportions with reference to the salinity affected soils and the healthy soils on shoot growth of plants.lt is noted that once the germination has occurred shoot growth in saline and healthy soils is almost constant. The plausible reasons may be that until and unless some hormonal growth promoting catalysts are present, shoot growth depends mainly air, water and the seed interactions, which are almost common in either case. However it is interesting to note that with increasing incorporation of the amendment up to an optimum amount shoot growth is catalyzed. This is suggestive that under the trial situations mustard husk releases some growth promoting plant hormones or nutrients, which promote shoot growth as is observed, Incorporations of the amendment beyond this optimum value (about 2x) is of little significance, rather it decreases the results. This is suggestive of the fact that fibrous (hydrophobic) and non-nutritive components of the mustard husk disturb seed, water and air interactions. Thus decreasing trends in the shoot growth after 15 days are quite expected. Observations recorded after 7 days are not very much conclusive and are almost comparable with the observed values in case of the healthy soils. Relatively less value of the shoot growth in salinity affected soils, as compare to that in case of healthy soils, suggest that impact of the amendment is a very slow process.

Overall plant growth promoting contributions of the mustard husk are revealed in the Table 3 and 4, Which tell about the leaf-areas, and the biomass respectively. Both parameters of investigations are related naturally (higher the leaf-area, higher the biomass and vice-versa). Thus it is noted that up to an optimum proportion of the amendment (2x as in above cases also) a remarkable contribution of the amendment in lead area, biomass and bulb weight is observed. On comparing the results of the healthy salinity affected soils, pronounced salinity effects are noticed. Thus in the absence of amendment, average leaf area in case of salinity affected soils is less than even 50% of the leaf area value in healthy soils. Similarly biomass and bulb weight in the salinity-affected soils are less than even 40% of the values observed in healthy soils. Interestingly the trends are reserve after addition of the amendments. Thus it is noted that at the most suitable optimum value (about 2x as noted earlier also) biomass as well as bulb weight are remarkably higher, this gives a firm-footing to the hypothesis proposed above that mustard husk mitigates adverse effects of salinity and provides plant growth promoting hormonal factors, which work very well in the situations of salinity. Further excess of the amendment beyond an optimum value (about 2x) is not favorable to the shoot growth and plant products. Increased fibrous contents and decreased soil contents in such situations may be possible reasons for the observed trends.

Conclusion

i). Mustard husk is a good amendment for agricultural practices in salinity affected areas.
ii). In optimum proportions (about 2x) it gives excellent results.
iii). Healthy plants harvested in presence of this amendment (on the basis of nature of leaves. Biomass and bulb) suggests that it also acts as a bio pesticide, making the plant immune to harmful micro and macro fauna.
Hence it is a good amendment.

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