J. Mycopathol. Res. **56(4)** : 247-250, 2019; (ISSN 0971-3719)

Factor productivity of Sunnhemp seed (*Crotalaria juncea* L) as influenced by different agronomic practices

S.K.SARKAR*
Central Research Institute for Jute and Allied Fibres, Barrackpore, 24-Parganas (N), Kolkata 700120, West Bengal

Received : 22.10.2018 Accepted : 12.11.2018 Published : 28.01.2019

Different agronomic practices like spacing, fertilizer, topping, insecticide spraying, fungicide spraying and irrigation were tested on seed yield, seed health and pests and diseases of sunnhemp at Sunnhemp Research Station, Pratapgarh. Results revealed that the yield attributing parameters as well as seed yield was found to be affected favourably in different treatments. Incidence of pests, diseases and seed discolouration was reduced in insecticide as well as fungicide sprayed field. However, seedling vigour was found to remains unaffected in most of the treatments

Key words: Sunnhemp, agronomic practices, sunnhemp seed yield, seed health

INTRODUCTION

Sunnhemp (*Crotalaria juncea* L.) is an important multipurpose crop grown all over India for fibre, green manure and fodder purposes. India is the largest producer of sunnhemp fibre followed by Bangladesh and Brazil. Till 1960s it was a premiere crop but with the advent of green revolution and synthetic fibre, its area under cultivation reduced sharply and at present it is only in the hands of small and marginal farmers of traditional areas. Since green revolution, rice-wheat cropping system become dominated both in developed and developing country which has disturbed the agro-ecosystem to the greatest extent. It is further aggravated due to intensive use of chemical fertilizer (NPK). As a consequence soil productivity and fertility is at stake. On the other hand, the ill effect of non-biodegradable synthetic fibre is a growing concern all over the world. Thus in the present day context sunnhemp becomes important due to its biodegradable fibre and green manuring characteristics. The statistics regarding seed requirement is lacking since the information on massive quantity of seed used for green manure is not accounted for. But definitely non-availability of quality seed is one of the major constraints for its expansion. Recently Indian Council of Agricultural Research is putting stress on production of quality seed of sunnhemp and dhaincha. Literature revealed that there is no seed production technology as well as centralized seed production agency for sunnhemp seed. To some extent seeds are produced in Vindhya region of eastern Uttar Pradesh and Madhya Pradesh with little care. However, it is reported that for seed production purpose, sowing in first fortnight of August is the best. But there were no detail studies on other agronomic aspects like spacing, irrigation, topping, use of fertilizer and spraying of fungicides and insecticides in connection with seed production, which needs proper attention to tap the maximum seed productivity. On the other hand almost 20% of seed is being affected by different kinds of fungal invasion causing seed discolouration and seed rotting. Pod is also affected by a number of pod borers like *Lasperysia tricentra*, *Utetheisa pulchella* and *Nazara* species and causing loss upto 20 %. Pod borers also facilitate the invasion of fungi which ultimately reduce the seed yield and seed vigour. Keeping in view the above information the present investigation has been undertaken.

MATERIALS AND METHODS

Field experiment on different agro-techniques like spacing, fertilizer, irrigation, topping and plant protection measures were carried out at

*E-mail: surjapath@gmail.com

Sunnhemp Research Station, Pratapgarh during *kharif* season (Longitude, 81°19'-82°27', latitude, 25°35'-26°11', Soil condition – sandy loam calcarious soil with pH 7.5-8.5, organic carbon 0.3-0.5%, NPK – 60-207, 5-12 and 80-162 kg/ha, respectively, Environmental conditions during August to January was maximum temperature 33.4-18.3°C, minimum temperature 26.3-7.5°C, relative humidity 98-89% and rainfall 250 mm. Different treatments under each agrotechnique were replicated four times except topping and fertilizer application where six replications were tested in Randomised Block Design (Table 1) with plot sixe 4m X 3m. The sowing was done in first fortnight of August and crop was raised with normal agronomic practices. Different yield attributing parameters like number of branching, number of flower bud, number of pod per plants were recorded randomly. Incidence of pod borer and wilt were recorded at harvest. Seed discolouration and seed yield were recorded after harvesting. Under laboratory condition seed rotting and seed vigour index [VI=germination x (root length + shoot length)] was recorded in blotter paper method (ISTA, 2005). The data were presented as pooled mean of three years.

RESULTS AND DISCUSSION

Effect of agriromic practices on seed yield attributes and seed health of suntemp has been furnished in Table 2.

Effect of spacing

The yield attributing parameters like branching, flower bud and pod setting were increased significantly with increased spacing over the broadcasted field. But seed yield was found to be at par with other treatments. This may be due to higher plant population in broadcasted field. However, 8% increase in yield was recorded in spacing with 30 cm x 10 cm. Higher seed yield with increased spacing was reported but there must be a compromise with population and seed yield as revealed in the present findings. The incidence of vascular wilt was found to be higher in broadcasted field than other treatments in all the years, least incidence of wilt (9.6%) was recorded in higher spacing (40cm x 30cm). Similar result was also recorded in seed discolouration. The incidence of pod borer (*Lasperysia tricentra*) was recorded between 7.0 (30cm x 10cm) to 9.2 % (40 cm x 30 cm) in 2003, whereas in 2004 it varied between 1.0% (30cm x 10cm) to 3.2% in broadcasted field. Therefore, the incidence of pests and diseases were found to be more in broadcasted field, This may be due to favourable microclimatic condition in broadcasted field. No significant variation in seedling vigour (vigour index) was recorded.

Effect of irrigation

Distinct effect of irrigation was recorded on number of flower bud and pod setting. In all the years the pod setting was higher in irrigated plot with maximum effect in one irrigation at 50% pod setting stage or two irrigations, one at 50% flowering and another one at 50% pod setting stage. Seed yield was also higher (14%) in irrigated field. Incidence of vascular wilt was found to be higher in irrigated plot with maximum in two irrigation. Seed discolouration was also found to be higher in irrigated plot and this might be due to favorable microclimate inside the pod. Seed vigour index was found to be more in irrigated plot in 2003 and 2005. However, no significant difference in vigour index was recorded in pooled data. Seed rotting was also found to be higher (12-16% in 2003, 2-3% in 2004 and 2-4% in 2005) in irrigated plot than unirrigated plot. Seed discolouration, seed rotting and seedling vigour have close relation with microbial attack of seed especially in leguminous crops. Irrigation increases the humidity inside the pod that favours the microbial growth.

Topping

Topping was done at 30 and 45 days after sowing (DAS). Consistently the yield attributing parameters like, branching, flower bud, pod setting as well seed yield was higher when topping was done at 45 DAS in all the years. The plant can not bear the shock of topping at initial stage (30 DAS) resulting in reduction in seed yield.

Fertilizer application

Distinct effect of fertilizer application either at $N_{20}P_{20}K_{40}$ or $N_{40}P_{20}K_{40}$ was recorded on number of flower bud as well as pod setting which translated into higher seed yield over all the year of experimentation. However, no effect on branching was recorded. Application of fertilizer reduces the incidence of wilt (1.1-2.5% in 2003 and 11.3-11.6% in 2005) than the check plot (4.2% in 2003 and

Table 1: Treatment details of the experiment

Treatment	Levels
Spacing	T_1: Broadcasting T_2: Line sowing 30cm x 10cm T_3: 40cmx15cm T_4: 40cmx30cm
Irrigation	T_1: No irrigation (check) T_2: One at 50% FL T_3: One at PS T_4: Two, one at FL and one at PS
Fertilizer	T_1: No fertilizer (check) T_2: $N_{20}P_{20}K_{40}$ T_3: $N_{40}P_{20}K_{40}$
Topping	T_1: (No topping (check) T_2: At 30DAS T_3: At 45 DAS
Fungicide spraying	T_1: No fungicide spraying (check) T_2: One at 50% FL T_3: One at PS T_4: Two, one at FL and one at PS
Insecticide spraying	T_1: No insecticide spraying (check) T_2: One at 50% FL T_3: One at PS T_4: Two, one at FL and one at PS

FL=50% flowering stage, PS= 50% Pod setting stage, DAS= Days after sowing

Table 2: Effect of agronomic practices on seed yield attributes and seed health of sunnhemp

Treatment	level	Branching	Flower bud	Pod setting	Seed yield (q/ha)	Seed discolouration (%)	Seed rotting(%)	Wilt (%)	Pod borer (%)	Vigour index
Spacing	Broadcasting	5.6	185	21.3	6.0	17.8	5.6	18.9	9.0	676
	30cmx10cm	5.9	239	26.5	6.5	15.7	5.9	14.6	7.0	695
	40cmx15cm	6.4	265	30.8	5.5	15.3	6.4	12.5	7.2	589
	40cmx30cm	6.9	293	29.9	4.8	16.3	6.7	9.6	9.2	688
	CD (P=0.05)	0.2	23.3	1.7	0.2	0.4	0.2	1.3	NS	NS
Irrigation	Check	5.6	129	34.5	5.0	28.6	10.4	12.8	9.3	764
	FL	5.3	132	40.0	5.16	29.0	12.1	14.9	7.9	727
	PS	5.6	120	37.7	5.7	29.7	12.7	14.0	8.1	803
	FL+PS	5.9	136	44.0	5.7	31.0	14.4	15.9	8.8	787
	CD (P=0.05)	NS	NS	2.7	0.58	0.94	NS	NS	NS	NS
Insecticide	Check	5.9	159.6	44.8	5.85	29.7	10.6		11.2	1007
(Endosulfan@0.15%)	FL	5.6	149.0	47.1	6.10	27.1	10.7		9.2	882
	PS	5.8	133.0	46.9	6.45	21.9	10.5		8.6	909
	FL+PS	6.2	124.6	50.3	7.01	19.2	11.9		7.9	979
	CD (P=0.05)	NS	10.5	NS	0.2	0.74	NS		0.75	NS
Fungicide	Check	5.8	128.6	38.6	5.46	28.4	14.1	14.0		771
(Carbendazim@0.10%)	FL	6.2	128	41.8	6.75	27.2	12.7	10.6		801
	PS	5.9	135	40.0	6.5	23.3	12.8	9.9		756
	FL+PS	5.8	136.3	44.8	6.5	23.6	10.8	8.3		811
	CD (P=0.05)	NS	2.2	1.5	0.10	1.2	1.0	0.8		NS
Fertilizer	Check	6.1	156.6	37.1	5.16	18.8		14.5	9.7	942
	20:20:40	5.9	144.6	40.5	5.7	28.6		12.8	8.0	933
	20:40:40	5.9	157.0	41.6	6.16	27.6		12.9	7.9	937
	CD (P=0.05)	NS	NS	NS	0.1	5.6		NS	NS	NS
Topping	Check	6.1	157	49.8	6.5					
	At 30DAS	9.0	172	52.3	6.0					
	At 45DAS	10.3	183	58.6	8.0					
	CD (P=0.05)	2.1	7.7	2.4	0.20					

FL= 50% pod setting stage, PS= 50% pod setting stage

13.8% in 2005). Incidence of pod borer was very less during the experimentation and no consistent result was noticed. However, microbial seed discolouration was higher in fertilized plot.

Insecticides

Two spraying of Endosulfan @ 0.15% reduces the pod borer to the tune of 43% over the check. Similarly seed discolouration and pod rotting was also reduced to the tune of 31.2 and 29% respectively in two spraying. Pod borer created the avenues for fungal invasion which ultimately causing seed discolouration and seed rotting either in pod itself or in storage. No significant difference in vigour index as well as seed rotting was noticed between different treatments. Although the number of pod setting was not significantly increased in sprayed field it was better in two spray (50.3) which reflects on significant increase (19.8%) in seed yield.

Fungicides

Spraying of carbendazim @0.10% significantly reduces the seed discolouration to the extent of 16-18% over the check. One spraying at pod setting stage and two spraying are at par in reducing seed discolouration. Similarly two spraying reduces seed rotting to the tune of 31%. No significant difference in vigour index of seed was noticed but slightly better seed vigour was observed in sprayed field. The number of pod setting was significantly higher in fungicide sprayed field which reflects on increase (25.9-30.0%) in seed yield than the control.

REFERENCES

Anon, 2001. Ann. Rep. on Network Projects on genetic evaluation and improvement of *Sesbania* (Dhaincha) and *Crotalaria* (Sunnhemp) for green manuring. NBPGR (ICAR), 202 p.

ISTA (International Seed Testing Association) 2005. Guide to ISTA overview. Bassersdorf, Switzerland. International Seed Testing Association, 32