

Original Research Article

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## Effect of Dates of Sowing and Fertilizer on Growth and Seed Yield of Sunnhemp Genotypes

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### ABSTRACT

A field experiment was conducted during kharif 2016, to study the effect of date of sowing and fertilizer application on seed yield and quality of Sunnhemp genotypes (*Crotalaria juncea L.*) at Agricultural Research Station, Kalloli, Gokak taluk Belagavi district, University of Agricultural Sciences, Dharwad. The field experiment comprised of twenty-four treatments with three replications in double split plot design. Among different dates of sowing, D3-First fortnight of August recorded highest plant height and more dry matter production (136.5 cm and 101.4 g plant<sup>-1</sup> respectively) followed by D2- second fortnight of July (133.5 cm and 97.99 g plant<sup>-1</sup> respectively) and D1- First fortnight of July (130.6 cm and 94.75 g plant<sup>-1</sup> respectively). With respect to fertilizer levels, F3- 37.5:75:37.5 NPK kg ha<sup>-1</sup> recorded higher plant height and dry matter production (136.4 cm and 100.8 g plant<sup>-1</sup> respectively) followed by F<sub>2</sub>- 31.25:62.5:31.25 NPK kg ha<sup>-1</sup> (134.9 cm and 99.2 g plant<sup>-1</sup> respectively) and F<sub>1</sub>- 25:50:25 NPK kg ha<sup>-1</sup> (129.3 cm and 94.14 g plant<sup>-1</sup> respectively). And Local genotype recorded higher plant height and dry matter production (134.0 cm and 98.55 g plant<sup>-1</sup>) compared to SUN-053 (133.1 cm and 97.53 g plant<sup>-1</sup>).

#### Keywords

Dates of sowing,  
Fertilizer levels,  
Genotypes, Plant  
height, Dry matter,  
Seed yield

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### Introduction

Sunnhemp (*Crotalaria juncea L.*, Fabaceae), a native of India, is fast growing annual crop. The genus name "Crotalaria" means 'rattle' and refers to the noise made by the seeds shaken in the mature pods. Species of this genus are wide spread throughout tropical, sub-tropical and to a lesser extent temperate

country. The sunnhemp crop is native to India. The crop is known in India by various names like 'Sonai' or 'San' (Hindi), 'Sanpat' (Bengali), 'Tag' (Marathi), 'Vakku' (Malayalam) 'Sanpat' (Oriya), 'Janumu' (Telegu), 'Sanabu' (Kannada).

These states cover nearly 87 per cent of the total area under cultivation of sunnhemp crop.

Among these states, Orissa alone produces 26 per cent of the total sunnhemp produced in the country. The most concentrated sunnhemp growing districts of U.P. are Varanasi and Jaunpur. Aurangabad and Jalana are the two main districts of Maharashtra which cultivate this crop in large scale. Ganjam District of Orissa grows this crop. Above five districts accounts for 20 percent of the country's area and 23 per cent of production. The fibre yield in the Balasore and Sundargarh districts of Orissa and Chittaur districts of Rajasthan is the highest in the country followed by Ganjam and Kalahandi districts of Orissa. (Hazraet *al.*, 2011)

Sunnhemp is the fastest growing species of the genus and is very effective in smothering out weeds. Almost any well drained soil is suitable for kharif' crop. It grown during rainy season is mainly utilized as a green manure crop (Dempsey, 1975). For fibre, it is grown on fairly light well drained soil (alluvium soil-old or new) having sandy loam or loamy textured soil that retains sufficient moisture.

Soil moisture per cent of 30 helps in good and effective germination. And it is an important source of natural fibre crops in India. Sunnhemp belongs to genus *Crotalaria*, which consists over 600 species of which *Crotalariajuncea* L., is the most popular green manure crop (Whyte and Trumple, 1953).

Apart from its green manuring value is gaining importance because of increasing demand for a specific grade fiber needed for manufacture of tissue paper and paper for currency as it contains high percentage of cellulose and low amount of lignin. However, the non-availability of good quality seed is one of the constraints in popularizing sunnhemp cultivation. Unfortunately, not much research work is carried out towards development of suitable agronomic techniques for seed production of sunnhemp to make

available the quality seeds to the growers. Therefore, Standardization of seed production technology like optimum time of sowing, different genotypes and fertilizer level for seed production in Sunnhemp is not available.

High quality seed is the key to successful agriculture. Seed is the critical input in any agriculture system and high yield of quality seed can be obtained only with improved agro techniques. The non-availability of good quality seed is one of the constraints in popularizing the practice of green manuring with Sunnhemp. Hence, the present research is under taken to evaluate sunnhemp varieties on varied practice like optimum time of sowing, fertilizer level for seed production in sunnhemp. With these objectives the study was undertaken on "Effect of date of sowing and fertilizer application on seed yield and quality of Sunnhemp (*Crotalaria juncea*L.)"

## Materials and Methods

The field experiment on Sunnhemp was carried out at Agricultural Research Station, Kalloli and seed quality studies were conducted at Seed Quality and Research Laboratory, National Seed Project (Crops), University of Agricultural Sciences, Dharwad. Kalloli, is situated in Northern Dry Zone of Karnataka and located at 74° 48' 96" North latitude, 160° 13' 70" East longitudes with an altitude of 553 M above mean sea level. The field experiment was laid out in a double split plot design with three factors, Main plot: Dates of sowing (D), i.e. D<sub>1</sub>- 1<sup>st</sup> fortnight of July, D<sub>2</sub> - 2<sup>nd</sup> fortnight of July, D<sub>3</sub>- 1<sup>st</sup> fortnight of August. Sub-plot: Genotypes (G), i.e. G<sub>1</sub>- Local and G<sub>2</sub> - SUN-053 and Sub subplots: Fertilizer levels (F), i.e. F<sub>1</sub>- 25:50:25 NPK kg ha<sup>-1</sup>, F<sub>2</sub>- 31.25:62.5:31.25 NPK kg ha<sup>-1</sup> and F<sub>3</sub>- 37.5:75:37.5 NPK kg ha<sup>-1</sup>.

The observation on plant height (cm) and dry matter production (g plant<sup>-1</sup>) were recorded at

harvest stage.

## Results and Discussion

The experimental results indicated that, higher the plant height and more dry matter production in D<sub>3</sub>G<sub>1</sub>F<sub>3</sub> (140.2 cm and 105.4 g plant<sup>-1</sup> respectively) treatment combination and depicted in Table 1.

In the present investigation, Plant height and dry matter production were more in the late date of sown crop. Among the date of sowing, D<sub>3</sub>- 1<sup>st</sup> fortnight of August sown have recorded highest plant height and more dry matter production (136.5 cm and 101.4 g plant<sup>-1</sup> respectively) compared to the crop sown on D<sub>1</sub>-, July first fortnight (103.6 cm and 94.75 g plant<sup>-1</sup>). The value of growth parameter like plant height were significantly higher in D<sub>3</sub>-first fortnight of August compare to the July first fortnight this might be responsible for higher value of dry matter

production in D<sub>3</sub>- 1<sup>st</sup> fortnight of August. These results are in conformity with the findings of Das *et al.*, (2014), who had also observed that jute crop sown on 9<sup>th</sup> August significantly recorded higher seed yield and dry matter production compared to crop that sown on 25<sup>th</sup> July and 24<sup>th</sup> August. These results are also in conformity with the findings of Rima and Nabam (2013) for LAI and total dry matter production in cowpea and Yadav (2003) for plant height and number of pods in cowpea. Among genotypes, Local genotype recorded higher plant height and dry matter production (134.0 cm and 98.55 g plant<sup>-1</sup>) compared to SUN-053 (133.1 cm and 97.53 g plant<sup>-1</sup>). This may be due to genetic potentiality of a genotype as it provides optimum growing condition such as temperature, light, humidity and rainfall. Similar findings were reported by Satish *et al.*, (2006) in dhaincha genotype DH-1 significantly higher seed yield than genotype ND-3 (Fig. 1–3).

**Fig.1** General view of date of sowing of sunnhemp Genotypes



**Table.1** Plant height and dry matter production at harvesting stage of sunnhemp as influenced by date of sowing, genotypes and fertilizer levels

Treatments		Plant height (cm) at harvest					Dry matter production (g plant <sup>-1</sup> ) at harvest				
		Fertilizer levels			Mean	Mean	Fertilizer levels			Mean	Mean
Date of sowing	Genotype	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>			F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>		
<b>D<sub>1</sub></b>	G <sub>1</sub>	126.9	131.8	134.4	131	<b>130.6</b>	93.29	94.82	97.83	95.31	<b>94.75</b>
	G <sub>2</sub>	125.2	131.5	134	130.2		91.4	94.17	97.01	94.19	
	Mean	129.5	135.4	137			94.24	99.94	101.5		
<b>D<sub>2</sub></b>	G <sub>1</sub>	128	135.9	136.6	133.5	<b>133.5</b>	93.39	100.4	101.2	98.32	<b>97.99</b>
	G <sub>2</sub>	129.6	135	136.2	133.6		94.72	98.55	99.69	97.65	
	Mean	128.8	135.5	136.4			94.05	99.48	100.4		
<b>D<sub>3</sub></b>	G <sub>1</sub>	133.6	138.6	140.2	137.5	<b>136.5</b>	96.05	104.6	105.4	102	<b>101.4</b>
	G <sub>2</sub>	132.6	136.7	137.2	135.5		95.99	102.6	103.6	100.8	
	Mean	133.1	137.6	138.7			96.02	103.6	104.5		
<b>Mean of G<sub>1</sub></b>		129.5	135.4	137	<b>134</b>		94.24	99.94	101.5	<b>98.55</b>	
<b>Mean of G<sub>2</sub></b>		129.1	134.4	135.8	<b>133.1</b>		94.04	98.45	100.1	<b>97.53</b>	
<b>Mean</b>		<b>129.3</b>	<b>134.9</b>	<b>136.4</b>			<b>94.14</b>	<b>99.2</b>	<b>100.8</b>		
<b>Sources</b>		S. Em. ±			C. D. (P = 0.05)		S.Em±			CD (P = 0.05)	
<b>Date of sowing (D)</b>		1.71			NS		0.92			3.6	
<b>Genotypes (G)</b>		1.22			NS		0.87			NS	
<b>fertilizer (F)</b>		2.02			5.9		0.97			2.82	
<b>D □ G</b>		2.12			NS		1.5			NS	
<b>D □ F</b>		3.5			NS		1.68			NS	
<b>G □ F</b>		2.86			NS		1.37			NS	
<b>D □ G □ F</b>		4.95			NS		2.37			NS	

D<sub>1</sub>- 1<sup>st</sup> fortnight of July

G<sub>1</sub>- Local

F<sub>1</sub>- 25:50:25 NPK kg/ha

D<sub>2</sub>- 2<sup>nd</sup> fortnight of July

G<sub>2</sub>- SUN-053

F<sub>2</sub>- 31.25:62.5:31:25 NPK kg/ha

D<sub>3</sub>- 1<sup>st</sup> fortnight of August

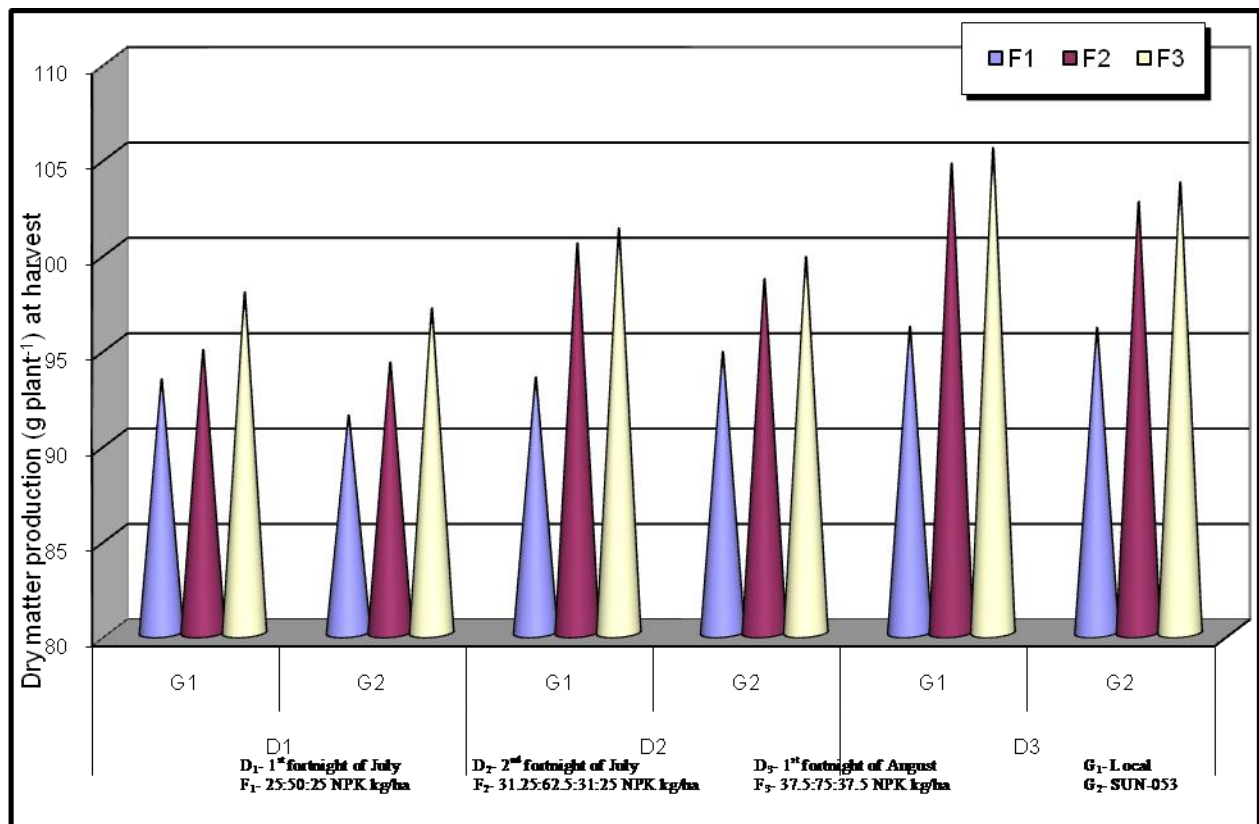
F<sub>3</sub>- 37.5:75:37.5 NPK kg/ha



**Fig.2** Different dates of sowing of sunhemp genotypes



**Fig.3** Dry matter production of sunhemps as influenced by date of sowing, genotypes and fertilizer levels



With respect to fertilizer, higher plant height and dry matter (136.4 cm and 100.8 g plant<sup>-1</sup>) was recorded higher in fertilizer level, F<sub>3</sub>-37.5:75:37.5 NPK kg ha<sup>-1</sup> than medium fertilizer level of fertilizer level F<sub>2</sub>-31.25:62.5:31.25 NPK kg ha<sup>-1</sup> (134.9 cm and 99.20 g plant<sup>-1</sup>) and low F<sub>1</sub>-25:50:25 NPK kg ha<sup>-1</sup> (129.3 cm and 94.14 g plant<sup>-1</sup>) fertilizer level. Increase in the seed yield is due to increased availability of nutrient (nitrogen, phosphorus and potassium) causing accelerated photosynthetic rate and thus lead to the more production of photosynthesis. The maximum yield with high rate of fertilization could also be attributed to better performance of crop which was obviously for higher growth components like plant height and dry matter production that resulted in over medium F<sub>2</sub>-31.25:62.5:31.25 NPK kg ha<sup>-1</sup> and low F<sub>1</sub>-25:50:25 NPK kg ha<sup>-1</sup> fertilizer levels. These results are in conformity with the finding of Santosh *et al.*, (2010), Gupta (2006).

In conclusion, the interaction effect of Date of sowing and genotypes, date of sowing and fertilizer, genotypes and fertilizer, Date of sowing. Genotypes and fertilizer were found non-significant. Among the fertilizer, genotype and date of sowing D<sub>3</sub>G<sub>1</sub>F<sub>3</sub> were recorded highest plant height and dry matter production. Further, this treatment resulted in better yield components, higher seed yield and better seed quality traits.

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