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Table 1. Rice Kc value (FAO, 1981)

Stage	Days	Kc
A	20	1.10
B	30	1.14
C	35	1.20
D	20	1.12

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OPTIMUM SEED RATE AND METHOD OF SOWING FOR PRE-MONSOON SOWING OF SORGHUM UNDER RAINFED VERTISOLS

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ABSTRACT

Experiments conducted at Agricultural Research Station, Kovilpatti for three years from 1984-1985 to 1986-1987 *Rabi* season indicated that pre-monsoon sowing i.e., two to three weeks before the onset of monsoon (October 15th) by fertiseed drill or *Gorru* or Country plough with a seed rate of 15 kg ha⁻¹ have recorded the highest grain and straw yield as it could utilise fully the monsoon and pre-monsoon showers.

KEYWORDS : Seed rate, Sowing method, Time of sowing, Rainfed condition Vertisol

Sorghum crop has the ability to grow under dry condition even at high temperature and moisture stress. In dryland agriculture, the availability of adequate water for raising the crops is often a constraint due to erratic rainfall distribution; Hence the success in rainfed sorghum cultivation largely depended on land management for conservation of moisture, proper time of sowing and maintenance of optimum plant population. One of the methods suggested in the time of sowing is the low cost technology of pre-monsoon sowing. It helps in the full utilization of pre-monsoon and monsoon showers. Also it helps in season crop coverage, relief of labour pressure and animal power requirements during monsoon and the crop escapes from aberrant weather condition viz., early withdrawal of monsoon for better yield (Periya Thambi and Palaniappan 1981; Usharani and Meena Sheriff 1982). However, the problem with regard to pre-monsoon sowing is the maintenance of optimum plant population which ultimately decides the success or failure in dry farming. To achieve assure and stable production under pre-monsoon sowing, proper methods of sowing and optimum seed rate are essential.

MATERIALS AND METHODS

Field experiments were conducted at Agricultural Research Station, Kovilpatti for three seasons (1984-1985 and 1985-1986 and 1986-1987 *rabi*) in split plot design with three replications. The treatments were; (a) three methods of sowing viz., sowing behind country plough (M_1), sowing with Gorru (M_2) and sowing with fertiseed drill (M_3) and (b) four times of sowing viz., sowing three, two and one weeks before the onset of anticipated monsoon (T_1 , T_2 and T_3 respectively) and sowing at the receipt of monsoon (T_4) as main plot treatments. Three levels of seed rates viz., 10, 15 and 20 kg.ha⁻¹ (S_1 , S_2 and S_3 respectively) were taken as sub-plot treatments.

The trial was conducted in black soil with a soil depth of 90 cm having a water holding capacity of 55 per cent uniform fertilizer dose of 40 kg N and 20 kg P₂O₅ ha⁻¹ was adopted. Broad beds and furrows (150 cm width) were formed. The test crop sorghum Cv. K. Tall was sown as per the treatments. Before sowing, the seeds were pelleted with monocrotophos (40% EC) against pest hazards. The treatment on time of sowing was fixed based on the normal expected onset of monsoon (15th October) which was worked out from the rainfall analysis of 30 years data of this station (Balasubramanian *et al.* 1983). The initial sowing was fixed as three weeks before the onset of anticipated monsoon based on the previous work of this station.

The observations on grain and straw yield were recorded and analysed statistically and furnished in Table 1.

RESULTS AND DISCUSSION

The results of sorghum grain yield during 1984-1985 and 1985-1986 revealed that the yield differences were significant for all the factors studied. Regarding the method of sowing, sowing with fertiseed drill was found to be superior to other methods and recorded the highest grain yield of 1999 kg and 1463 kg.ha⁻¹ respectively during 1984-1985 and 1985-1986. In respect of time of sowing, two weeks before the onset of anticipated monsoon sowing recorded the highest grain yield in both the years and was significantly superior to other times of sowing and the yields were 2711 kg and 1872 kg.ha⁻¹ respectively. The seed rate of 15 kg.ha⁻¹ was found optimum to achieve higher grain yield of 1954 kg and 1409 kg.ha⁻¹ for respective years., than the normal seed rate of 10 kg ha⁻¹ (1769 and 1346 kg.ha⁻¹).

Hence sowing two weeks before the onset of anticipated monsoon using fertiseed drill at a seed rate of 15 kg.ha⁻¹ was found to be the best combination to obtain higher grain yield in sor-

ghum under rainfed condition. During 1986-1987 the differences in grain yield due to times of sowing were found significant while other treatments studied and their interactions were not significant. Among the different times of sowing, three weeks before the onset of anticipated monsoon sowing recorded the highest grain yield 3200 kg.ha^{-1} and it was significantly superior to other times of sowing and was followed by sowing two weeks before the onset of anticipated monsoon recorded 2561 kg.ha^{-1} . The pooled mean of three years grain yield data revealed that, sowing with fertiseed drill, adopting a seed rate of 15 kg.ha^{-1} , two to threeweeks before the onset of anticipated monsoon was the best to obtain higher grain yield of sorghum under rainfed conditions.

Among the time of sowing, during 1984-1985, onset of monsoon sowing recorded the highest straw yield of 5531 kg.ha^{-1} and it was on a par with sowing two weeks before the onset of anticipated monsoon (5463 kg.ha^{-1}) which may be due to excessive vegetative growth. In the years 1985-1986 and 1986-1987 the difference in straw yield was significant for all the main factors studied. Among the methods of sowing, sowing with fertiseed drill recorded explicitly the highest straw yield of 4288 kg.ha^{-1} during 1985-1986 and was on a par with sowing behind country plough (4278 kg.ha^{-1}). During 1986-1987, sowing behind the country plough recorded significantly the highest straw yield of 9396 kg.ha^{-1} . Regarding the time of sowing, pre-monsoon sowing with seed rate of 15 kg.ha^{-1} recorded higher straw yield in both the years. The pooled mean of the straw yield data indicated that sowing with any implements three weeks before the onset of anticipated monsoon using a seed rate of 15 kg.ha^{-1} gave highest straw yield of sorghum under dryland condition.

In almost all the years, the pre-monsoon sowing recorded higher grain and straw yield, possibly due to optimum level of plant population which in turn could be due to the effective full utilization on monsoon showers as well as the pre-monsoon soaking showers for early establishment. Further this sowing was least affected by moisture stress during the critical crop growth periods. This provided the crop optimum level of dry matter, foliage cover and higher assimilating source and sink capacity. The high assimilate supply to sink may result in better grain and straw yield. These findings are in accordance with the earlier report of Herbert *et al.* (1986).

The crops sown at the receipt of monsoon were affected by acute drought occurred during the critical crop growth stage resulted in drastic reduction in plant height as well as plant population. During the year 1984-1985 the grain yield under the treatment, time of sowing at the receipt of monsoon was low (179 kg.ha^{-1}) while the straw yield was higher (5531 kg.ha^{-1}). This may be due to the early drought from seedling stage to boot leaf stage which affected the crop growth and reduced the plant height and later relief from drought could help the crop only to recover from stress and regeneration and movement of source to sink may be as little as to give low grain yield and higher straw yield. It was also reported that the level at which water requirements were met during the initial 50 days after sowing had a decisive influence on production at grain setting and grain filling stages (Forest and Lidon 1984).

Regarding seed rate, slightly higher than the normal seed rate viz., 15 kg.ha^{-1} was found to be optimum for getting higher grain and straw yield. This was in conformity with the findings of Worker (1986).

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Table 1. Sorghum grain and straw yield kg.ha⁻¹

Treatments	Grain yield.kg.ha ⁻¹				Pooled mean	Straw yield kg.ha ⁻¹				Pooled mean
	1984-1985		1985-1986			1984-1985		1985-1986		
	1984-1985	1985-1986	1984-1985	1985-1986		1984-1985	1985-1986	1984-1985	1985-1986	
I. Main plot										
a) Method of sowing										
M ₁	1751	1268	2073	1698	5241	4278	9396	6305		
M ₂	1763	1346	1975	1683	4889	4102	8464	5818		
M ₃	1999	1463	2036	1833	5111	4288	8097	5823		
SE	60	5	91		150	38	306			
CD (5%)	177	16	NS		NS	112	898			
b) Time of sowing										
T ₁	2400	1788	3200	2448	4982	4471	11929	7128		
T ₂	2711	1872	2561	2381	5463	5032	9663	6708		
T ₃	2060	1540	1463	1688	4340	4190	7530	5354		
T ₄	179	236	886	435	5531	3196	5487	4739		
SE	70	6	105	173	44	353				
CD(5%)	204	18	307	509	129	1036				
II. Sub-plot										
Seed rate										
S ₁	1769	1346	1993	1703	5037	4170	8430	5878		
S ₂	1954	1409	2065	1799	5216	4342	9313	6291		
S ₃	1790	1322	2025	1712	4988	4156	8214	5777		
S _B	47	6	61		151	32	126			
CD(5%)	133	18	NS		NS	92	359			

M - Method of sowing,

T - Time of sowing,

S - Seed rate,

NS - Not significant

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CROPPING SYSTEM STUDIES IN SANDY LOAM SOILS OF THE CAUVERY NEW DELTAIC AREAS

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ABSTRACT

A field trial was conducted at Agricultural Research Station, Pattukkottai with ten different systems during 1984-1986 to evolve a suitable cropping system for the sandy loam soils of new delta of Thanjavur District. The results indicated that there is a possibility to introduce a four crop sequence (rice-blackgram-gingelly-greengram within a field duration of 340 days) with highest net profit (Rs. 21, 457 ha⁻¹) and high cost benefit ratio (3.61). The existing rice-groundnut-maize may be improved by intercropping groundnut with blackgram or soybean. Gingelly and blackgram can be cultivated either in the second season (Dec.-Apr.) or in the third season (May-Aug.).

KEYWORDS: Cropping System, Sandy Loam Soil, Cauvery Delta.

The entire sandy loam soils of Thanjavur (Cauvery new delta or CMP canal area) is not only a rice belt but also a potential cash crop area. Though there are double rice crop area, growing of single medium duration rice followed by cash crops are gaining momentum. Crops like groundnut, gingelly and maize are extensively cultivated (IADP 1980). But yet there is scope to

intensify the pattern with newer crops/varieties and intercrops.

MATERIALS AND METHODS

A study was undertaken during 1984-1986 at Agricultural Research Station, Pattukkottai to evolve suitable cropping system with