

## Impact of Pre-sowing Seed Treatments on Seed Germination, Plant Establishment and Yield of Sorghum

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**ABSTRACT** Present investigation was undertaken in order to know the impact of pre-sowing seed treatments on germination, seedling establishment and yield in sorghum genotype 2077 B. The different pre-sowing seed treatments showed differential response for all the nine characters. Pooled analysis of three years data indicated that the T<sub>4</sub> treatment i.e. hydration of seed for 17 h and drying at room temperature below 25°C followed by dry dressing with 0.25% thiram was superior for laboratory germination (86% & 77%), field establishment (145 plant & 139 plants), days to maturity (109 days & 112 days) and yield/ha (3789 kg & 3169 kg) in fresh as well as revalidated seed lot, respectively. Similar response was observed for this treatment during individual years also.

**Key words** : sorghum, invigoration, seed treatments.

Sorghum is an important *kharif* as well as *rabi* cereal crop of Maharashtra state. Establishment of seedling in the field is an important factor in maximizing crop production and productivity, which largely depends upon seed germination and seedling vigour. It is a well known fact that the seed germination, seedling vigour and establishment of seedling in the field could be improved by imposing certain pre-sowing treatment to seed. Hence, the present investigation was undertaken to know the impact of different pre-sowing seed treatment on seed germination, seedling establishment and yield in sorghum genotype 2077 B.

### MATERIALS AND METHODS

Following pre-sowing seed treatments were given to the fresh and revalidated seeds of sorghum genotype 2077 B.

T<sub>0</sub>: Control (Untreated)

T<sub>1</sub>: Hydration for 17h and drying at < 25°C.

T<sub>2</sub>: Cold hydration for 72h at 10°C followed by surface drying.

T<sub>3</sub>: Hydration with 50 ppm GA<sub>3</sub> for 17h and surface drying at < 25°C.

T<sub>4</sub>: T<sub>1</sub> + dry dressing with 0.25% thiram

T<sub>5</sub>: Hydration with 2% KH<sub>2</sub>PO<sub>4</sub> for 17h and drying at room temperature.

After the pre-sowing seed treatments the seed were dried at room temperature and initial seed germination was recorded in each treatment as per standard procedure [1]. Field experiment was conducted in FRBD with a spacing of 45 x 15 cm in three replication during 2002-03, 2003-04 and 2004-05. Observations on initial laboratory seed germination (%), field emergence (%), seedling dry weight (g), days for 50% flowering, days to maturity, final plant stand/plot, yield/plot (g), yield/plot and yield/ha(kg) were recorded. Statistical analysis of individual year data and pooled analysis of three years data were carried out as per procedure given by Panse and Sukhatme [2].

### RESULTS AND DISCUSSION

The experimental results for fresh and revalidated seed lots are presented in Table 1.

Table 1. Effect of presowing seed treatment on fresh and revalidated seeds of sorghum genotype 2077 B

Treat-ments	Germination (%)		Field emergence (%)		Seedling dry wt./ 10 seedling (g)		Final plant stand/ net plot		Grain yield (kg/ha)	
	Fresh	Revali-dated	Fresh	Revali-dated	Fresh	Revali-dated	Fresh	Revali-dated	Fresh	Revali-dated
T <sub>0</sub>	76.0	71.7	72.0	66.3	0.117	0.108	125.3	119.7	2620	2303
T <sub>1</sub>	81.0	74.7	78.0	71.7	0.141	0.120	142.0	135.0	3205	3029
T <sub>2</sub>	78.7	72.7	74.0	68.7	0.127	0.113	128.3	122.7	2877	2608
T <sub>3</sub>	81.3	74.3	78.7	72.0	0.146	0.126	136.0	129.7	3097	2859
T <sub>4</sub>	85.7	77.0	82.3	75.0	0.152	0.139	145.3	138.3	3489	3169
T <sub>5</sub>	76.3	72.3	72.3	67.3	0.128	0.117	130.7	124.7	2894	2671
Mean	79.8	73.8	76.3	70.2	0.135	0.121	134.6	128.4	3030	2773
S.E.±	0.31	0.38	0.45	0.92	0.002	0.002	0.78	0.69	69.1	44.3
CD=0.05	0.91	1.10	1.31	1.65	0.006	0.007	2.27	1.99	199.2	127.9

Pooled analysis of three years data is predominantly discussed in this paper. Pre-sowing seed treatments of fresh as well as revalidated seed of sorghum showed significantly differential response for all the characters in individual years as well as the data pooled over three years (Table 1). Among the different pre-sowing seed treatments, hydration of seeds for 17h and drying at room temperature below 25°C followed by dry dressing with 0.25 per cent thiram (T<sub>4</sub>) was found significantly superior and effective in increasing the laboratory germination of sorghum genotype 2077 B from 76 to 86 per cent and 72 to 77 per cent in fresh and revalidated seed respectively and it was followed by T<sub>3</sub> treatment. Similar responses of these treatments were also observed for individual years. The beneficial effect of pre-sowing wetting drying seed treatments in germination advancement and embryo enlargement within the seed was reported by earlier workers also [3-5]. The T<sub>4</sub> treatment was also found significantly superior over the rest of treatments for field emergence percentage in fresh seeds (82%) and revalidated seeds (77%) followed by T<sub>3</sub> treatment. The beneficial effect of hydration-dehydration treatment is known to advance the first phase of germination due to increased DNA and RNA

synthesis [6]. The T<sub>4</sub> treatment was also found superior for seedling dry weight (0.15 and 0.14 g) in fresh and revalidated seeds respectively. Final plant stand was significantly differed due to different treatments in both the seed lots. The T<sub>4</sub> treatment established significantly the highest plant stand/net plot (145 and 139 plants) in fresh and revalidated seeds respectively. Invigoration seed treatments increases the field emergence over the control in fresh as well as carry over seeds was also reported by Ramrao *et al.* [4].

The days required for 50% flowering and maturity were significantly influenced by the different seed treatments. The T<sub>4</sub> treatment advanced flowering by 5 days in fresh and 6 days in revalidated seeds and maturity by 8 days in fresh and 9 days in revalidated over the control when pooled over three years. The soaking - drying seed treatment might have activated the synthesis of RNA and protein in the first phase of germination, which was advantageous for subsequent growth phases [6, 7].

The yield/ha was significantly influenced by different pre-sowing seed treatments. Among the different treatments, pre-sowing hydration of seed for 17h and drying at room temperature below

25°C followed by dry dressing with 0.25 per cent thiram ( $T_4$ ) was found to be significantly superior for yield/ha (3789 kg and 3169 kg) in fresh and revalidated seed lot, respectively, when pooled over three years. Similar trend was observed for individual year. Increase in seed yield in different genotypes due to pre-sowing seed treatments was observed by earlier research workers also [3-5, 8].

On the basis of three years data, the pre-sowing seed treatment, hydration for 17h and drying at room temperature to original moisture content of seed followed by dry dressing with 0.25% thiram is recommended for enhancing laboratory seed germination, rapid field emergence, better stand establishment and more yield in sorghum. Further, under shortage of good fresh seed of sorghum, the pre-sowing treatment of carry over seed may be useful for enhancing seed germination and could make it possible to face the problem of shortage of seed due to unforeseen situations.

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