

# Influence of Hydro priming of seeds on growth parameters of Groundnut (*Arachis hypogaea* L.)

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## ABSTRACT

Germination and seedling emergence are the critical stages in the plant's life cycle. Insufficient seedling emergence and inappropriate stand establishment are the main constraints in the production of crops which receiving less rainfall. On the other hand good establishment increases competitiveness against weeds, increases tolerance to drought period, increases yield and avoids the time consuming need for re-sowing that is costly too. A field study was conducted at farmer's field of Kodukkanpalayam village in Cuddalore district, Tamilnadu during Rabi 2016, to assess the effect of hydro priming duration on growth components of Groundnut. The experiment was adopted in Randomized Block Design (RBD) with seven treatment and three replications. The treatments consist of seed hydro priming of 0 hours (control), 6 hours, 12 hours, 24 hours, 36 hours, 48 hours and 72 hours. The results indicated that all traits such as percentage of seed germination, seedling emergence, plant height, leaf area, number of leaves and leaf area index (LAI) were significantly influenced by the duration of hydro priming. The seeds soaked for 24 hours duration gave the highest percentage of seed germination (97.1%), no damages to testa (outer seed coat) and seedling establishment was within 3-5 days, whereas the seed soaked for 72 hours was the least. Therefore, the results suggested that hydro priming is a useful method of improving the percentage of seed germination, seedling emergence, stand establishment and productivity of groundnut. Hence it should be recommended for groundnut growing farmers of cuddalore district to adopt this cost-effective technology in the production of groundnut.

**Keywords:** Groundnut, hydro priming, seed germination and LAI.

## INTRODUCTION

Groundnut is one of the most important oilseed crops and also a food crop of leguminous family. Germination of groundnut is hypogeal as the cotyledon remains on the ground. The crop is grown for human consump-

-tion with pods formed on or beneath the soil containing seeds that can be eaten fresh as a snack or mature as pulse. The seed germination is slow, poor, less and sporadic and in the field. Seedling emergence could take up to 10-15 days after sowing. Usually, farmers are using their own saved seed. The low vigour and viability, many time combined with adverse environmental conditions result in poor crop establishment and ultimately the decreased crop yield. The overall productivity of this crop in India is quite low (11.88q/ha).

Seed priming is by soaking the seeds in water overnight, drying them before sowing markedly improves the plant stand, establishment, vigour and yield. Priming allows some of the metabolic processes necessary for germination to occur. Seed priming has been commonly used to reduce the time between seed sowing and seedling emergence and to synchronize emergence. In seed priming, the osmotic pressure and the period for which the seeds are maintained in contact with the membrane are sufficient to allow pre-germinative metabolic processes to take place within the seeds.

Seed priming is an effective technology to enhance rapid and uniform emergence and to achieve high vigour, leading to better stand establishment and yield. It is a simple and low cost hydration technique in which pre-germination metabolic activities start without actual germination, and then re-dried until close to the original dry weight. Seed priming is employed for better crop stand and higher yield in a range of crops. Harris *et al.*, (2001) reported that seed priming led to better establishment and growth, earlier flowering, increase seed tolerance to adverse environment and greater yield of crops. Rehman *et al.*, (2011) reported that seed priming is a cost effective technology that can enhance early crop growth leading to earlier and more uniform stand with yield associated benefits in many field crops including oilseeds. The faster emergence of primed seeds may be due to the completion of pre-germinative metabolic activities making the seed ready for radical protrusion and the primed seed germinated soon after planting compared with untreated dry seed.

Keeping this in view, a study was aimed at predicting the duration of the priming suitable for optimum germination and seedling growth of groundnut.

## MATERIALS AND METHODS

This experiment was conducted at farmer's field of Kodukkanpalayam village in Cuddalore district, Tamilnadu during Rabi 2018. The experiment is situated at 11°46'29.2'' N latitude, 79°40'1.38''E longitude and an altitude of about 20.65 MSL.

The experimental area is well fertile sandy loam soil and it is pulverized into workable form. Seeds of groundnut was obtained from the Regional Research Station, TNAU, Virudhachalam were used for sowing. The groundnut seeds were divided into seven groups and each group was assigned to a degree of priming period.

The treatments are various priming periods

- T<sub>1</sub> - Control (0 hours)
- T<sub>2</sub> - Soaking the seeds in water for 6hours at 23°C
- T<sub>3</sub> - Soaking the seeds in water for 12hours at 23°C
- T<sub>4</sub> - Soaking the seeds in water for 24hours at 23°C
- T<sub>5</sub> - Soaking the seeds in water for 36hours at 23°C
- T<sub>6</sub> - Soaking the seeds in water for 48hours at 23°C
- T<sub>7</sub> - Soaking the seeds in water for 72hours at 23°C

After soaking, the seeds were spread on a filtered paper and allowed to sundry for 3hours and were sown immediately after shade drying. The readings were collected on 3DAS and 7 DAS for germination percentage and 30 DAS for plant height, number of leaves and leaf area index.

## RESULTS AND CONCLUSION:

The groundnut growth components were significantly influenced by hydro priming.

The highest germination percentage was obtained from 24 hours (97.1%) of hydro priming which was significantly higher compared to 6 hours (68.9%) and control (50.1%) respectively at 7 DAS. However the lowest percentage emergence was recorded from 48 hours (8.3%) and it was also observed that 72 hours didn't record any seedling emergence at both the days. The plant height at 30 DAS was also influenced by hydro priming of 24 hours duration and recorded maximum plant height (28.53 cm) which was significantly higher than compared to the other priming duration. Hydro priming for 6 hours was

**Table 1 Influence of hydro priming on growth components of Groundnut**

Treatment	Emergence percentage (%)		Plant height (cm) 30 DAS	No. of leaves 30 DAS	LAI 30 DAS
	3 DAS	7 DAS			
T <sub>1</sub>	35.7	50.1	21.40	31	0.98
T <sub>2</sub>	54.2	68.9	24.57	33	1.28
T <sub>3</sub>	66.5	78.3	27.33	36	1.54
T <sub>4</sub>	<b>91.7</b>	<b>97.1</b>	<b>28.53</b>	<b>39</b>	<b>1.85</b>
T <sub>5</sub>	51.9	65.8	22.04	33	1.25
T <sub>6</sub>	5.7	8.3	9.78	18	0.31
T <sub>7</sub>	00.0	0.00	00.00	00.00	0.00
SE <sub>d</sub>	2.1879	2.5452	0.7858	1.2123	0.0480
CD(P=0.05)	4.7671	5.5456	1.7122	2.6415	0.1046

found to be increased plant height (24.57 cm) but which was not statistically differed from control (21.40 cm).

The results of the study showed that the 24 hours priming duration significantly recorded the maximum number of leaves (39) when compared to control (31). The least number of leaves was recorded in 48 hours (18) priming duration. The least leaf area index was observed from 48 hours (0.31) priming duration. The maximum leaf area index was obtained from priming duration of 24 hours (1.85) when compared to control (0.98).

## CONCLUSION

The seed priming with water (hydro priming) at 24 hours duration period increased the germination percentage (97.1%), plant height (28.53 cm), number of leaves (39) and leaf area index (1.85) leading to ability of groundnut to grow successfully in the field. Therefore, hydro priming is a simple, low cost and eco-friendly technique for improving groundnut seedling growth.

Results revealed that the effect of hydro priming on germination percentage of groundnut was significant. The short period of priming resulted in early seedling emergence compared to the control. This was found in 12 hours and 24 hours primed seeds, although 24 hours was the highest. There was poor germination in 36 hours of primed seeds, but 48 hours of primed seeds inhibited germination. Ogbuehi *et al.*, (2013) reported that the early emergence of the primed seeds may be as a result of advancement in seed metabolic activities.

However, hydro priming had a positive effect on the plant height. It showed that the effect of hydro priming is beneficial at germination and early vegetative stage of crop. This is in agreement with Basra *et al.*, (2005) that hydro priming persisted till early vegetative growth of maize.

Similarly the effect of hydro priming on the number of leaves across the primed seeds at early seedling growth of groundnut.

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