

# Planting Eucalyptus Using Hydrogel During Dry Season

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## ABSTRACT

Hydrogel is a white coloured dry granule which can absorb water several times its mass and become a transparent hydrated gel. When hydrated gel is incorporated into dry soil it slowly releases absorbed water into the soil and gets rehydrated during rain or addition of water through its property of water absorption and release cycles in soil. This property of Hydrogel can be specifically adopted to supply water to plants for a short but critical period during planting and establishment in dry soil. JK Paper Mills targeted to plant about 8000 ha. per year which is high to achieve during rainy season. Hence a preliminary trial of planting Eucalyptus in dry months of January and March 2011 using Hydrogel was taken up. The root system start growing new roots within a week of planting, penetrate into gel and surrounding soil, and get established. During odd rains received during dry period before rainy season the gel rehydrated and the plants grew at a rate of 1 cm a day. The trial needs to be extended after 2011 rainy season.

## Introduction:

Paper manufacturing industries in India are expanding as a consequence of which demand for pulp wood has increased considerably. To meet increased pulp wood demand the industries plan to plant pulp wood species on a large scale and try to achieve the planting targets within rainy season. Quite often the planting targets are not achieved or there will be high degree of transplanting stress and mortality due to adverse conditions like intermittent dry spells or droughts. To overcome this problem many companies in Brazil, South Africa and Laos are using Hydrogel in planting.

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## Literature

In South Africa lack of water is considered to be one of the most critical factor affecting seedling survival and growth of plantations. Institute for Commercial Forestry Research started testing hydro gel for commercial use in raising plantations (ICFR(1); ICFR (2). Subsequent improvements were made to use hydro gel for the establishment of Eucalyptus clonal plantations on sandy clay loam soil in Zululand during winter (Vierro *et al.* (3); Vierro *et al.* (4); Vierro *et al.* (5); Vierro, (6)). The author was involved at Lao PDR in using hydro gel successfully for raising Eucalyptus plantations during off season.

## Material and Methods

Initial trial was taken during third week of Jan 2011 followed by a pilot scale trial in third week of March 2011 when the soil was dry and not favorable for planting.

The procedure adopted was as follows.

- Planting pits were dug up ahead of planting operation. 30cm x 30cm x 30cm size pits were dug at a spacing of 3m between rows and 1.5m within rows. The dug up soil was filled back into the pits
- Hydrated gel was prepared in advance at the time of planting. 1kg dry gel granules were poured into 200L water filled in 210L plastic drums (The ratio of gel to water was 5gm gel to 1L of water). The gel started absorbing water and became slurry in consistency. The mixture was stirred for 20 to 30 minutes so that the gel got fully hydrated. Uniform hydrated gel and water mixture was scooped with 10L plastic buckets and carried to planting pits.
- At the time of planting 1L water was poured at the centre of pit and a planting hole of size 10cm x 10cm x 15cm deep was dug up using a sharpen wooden stake. Hydrated gel carried in buckets was agitated to have uniform mixture; 1L was scooped out using a plastic jug and poured into planting hole.
- Planting was done by carefully submerging root plug into the hydrated gel filled in planting hole using fingers. After planting the hydrated gel was covered with 5cm thick soil. Note: The soil should not be compacted.
- Two weeks after planting when the plants started showing wilting symptoms, 2L water was applied to

each of the plant.

- At the time of re watering after two weeks of planting, 50gm DAP and 15gm MOP fertilizer were applied in two 15cm deep holes made at 15cm away from the plant. Second dose of the same fertilizer was applied at the start of monsoon in June 2011.

## Results and Discussion

Results of the trial were as follows

- The soil was completely dry and not ideal for planting during planting in third week of Jan 2011 because of

**Table-1: Height growth of different clones and different container size plants planted in during dry season (Jan.2011)**

Clone	Average Ht.(6month) m		Av. Ht.(m) PB+RT
	Polybag	Root Trainer	
3	2.9	1.7	2.4
4	2.5	2.3	2.4
9	2.7	2.0	2.4
7	2.3	2.5	2.4
12	2.9	1.7	2.3
5	2.3	2.2	2.2
1	2.3	2.1	2.2
15	2.3	2.1	2.2
8	2.4	1.8	2.1
17		2.1	2.1
6	1.8	2.2	2.0
18	1.9	2.1	2.0
14	1.6	2.2	2.0
11	2.7	1.0	1.8
10	1.5	2.0	1.8
16		1.7	1.7
2N	2.2	1.2	1.6
Av. Ht (m)	2.3	1.9	2.1

**Table-2: Height growth of different clones and different container size plants planted in during dry season (Mar.2011)**

Clone	Average Ht.(4month) m		Av. Ht.(m) PB+RT
	Polybag	Root Trainer	
13	1.3	1.7	1.5
1	1.5	1.0	1.2
11	1.4	1.3	1.3
12	1.5	0.9	1.2
7	1.2	0.9	1.1
15	1.5	1.3	1.4
17	1.4	1.0	1.2
4	1.3	1.0	1.1
3	1.4	1.0	1.2
5	1.7	1.2	1.5
8	1.8	1.3	1.5
10	1.6	1.6	1.6
14	1.5	1.1	1.2
16	1.7	1.2	1.4
6	1.3	1.0	1.1
9	1.2	1.2	1.2
2	1.5	1.3	1.4
Av. Ht (m)	1.5	1.2	1.3

water stress.

- Addition of hydrated gel around the root plug at the time of planting provided water to the plants reducing transplanting stress significantly.
- The plants were healthy and did not show transplanting stress for two weeks.
- After two weeks the plants indicated temporary wilting symptoms.
- The hydro gel got rehydrated after addition of water after two weeks and provided water to the plants for final establishment.
- Root system started growing through the surrounding gel and started penetrating into soil. The plants got established a month after planting with 100 percent survival.

There was intermittent rain after one month, two month and three months of planting. In each rain the hydro gel got rehydrated and supplied water to the plants. The plants utilized the water from intermittent rains and grew vigorously.

- Height and survival were measured at the start of monsoon and the data is shown in Table-1 and Table-2. Survival rate was 100%.

## Conclusions

The new findings suggest that hydro gel can be successfully used in raising plantations during off season or during adverse conditions like droughts or intermittent dry spells. The findings suggest that Indian paper industries having large scale planting programme can plan for planting using hydro gel during off season. The trial needs to be extended after 2011 rainy season.

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