

## EFFECT OF CURCUMA CAESIA LEAVES ON RICE SEED GERMINATION AND SEEDLING ESTABLISHMENT

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**ABSTRACT:** *The traditional use of Curcuma caesia leaves by farmers to stimulate rice seed germination is scientifically confirmed in this article.*

### INTRODUCTION

Many examples are found in the botanical literature on the effects of plants to one another. Plant exudate are leachates affect other plant seeds in their environment of germination. According to Mayer and Mayber (1989) the exudates from sordhum contain a hydroquinone derivative that stimulates seed germination of striga which is a parasite of Sorghum.

There exist many examples regarding the improvement of rice seed germination by various methods. Stimulatory effect on germination has been found in rice by treating with UV rays as well as leachate from germinating Phaseolus rhus seeds (Ramaih and Rao, 1953).

From earlier times farmers raise seed-lings by sowing sprouted seeds in ploughed paddy fields. After soaking, the seeds are kept for sprouting in containers or baskets. Traditional farmers use leaves of wild arrowroot (curcuma caesia) in between the rice seeds prior to sowing. Many layers of leaves are placed between the seeds to effect maximum vicinity of the leaves to the seeds. It is presumed that these leaves help enhanced sprouting and root growth which enable the easy anchorage of seedlings in the soil when they are sown in the field.

The present investigation is aimed at the elucidation of the scientific principle behind the use of curcuma caesia leaves during sprouting of rice seeds. In many cases, the germinating seeds/ seedlings must first of all establish anchor age by the root in the soil and ensure absorption of water and solute which are pre-requisites for the growth.

### MATERIALS AND METHODS

Locally available rice seeds (*Oryzasativa*) were used for the present study. Leaves of *Curcuma caesia* Roxb. (*C. malabarica* Velayu dhan et al) were collected from wild plants growing near to calicut University campus Germination studies were conducted in 9 cm dia Petri dishes. Twenty seed a were put in each Petri dish soaked in tater and kept for germination. Studies were conducted by lining the plates with the *C. caesia* leaves and keeping the seeds in between them. The leachate and extracts of

*C. caesia* leaves were also used as the media for germination.

- 1 Seeds soaked in leachate obtained after soaking the leaf cuttings in water for 1 hr.
- 2 Seeds soaked in leaf extract in water 5% (w/v)
- 3 Seeds soaked in leaf extract in water 5% (w/v)

4. Seeds placed between the leaves lines in the Petri dish.

Controls were kept by soaking the seeds in distilled water. Observations were made every day and germination percentage, length of radicle and number of secondary roots on radicle were recorded after 8 days of germination.

## RESULTS

All treatments and control showed 100% germination on third day indicating no dormancy in rice seeds used for the present study. A moderate level of stimulatory effect on secondary root formation was shown by seeds treated with the leachate (T1) of leaf discs in water (Table 1, Fig 1b). Treatments T2 and T3, however exhibited a slight retarding effect on growth of radicle/seedlings (Table 1, Fig 1c,d).

An outstanding stimulatory effect on radicle growth (Fig 1e) as well as secondary root formation (Table 1, figs 3,4) was shown by the treatment 4 with the presence of *C. caesia* leaf discs placed above and below the seeds. In comparison with the control (Figs 2,4), this treatment resulted in doubling of secondary root formation. Seedlings treated with leachate (T1) also exhibited an increased rate of secondary root formation. Notwithstanding the inhibitory effect of T2 and T3 on seeding vigour, secondary root initiation was shown by them (Table 1).

## DISCUSSION

For paddy cultivation, nursery fields are filled with water before sprouted seeds are sown and so the sprouted seeds may be in an anaerobic condition and usual practice is that after sowing, the excess water is drained off from the field so that the sprouted seeds get aerobic condition for future growth.

According to Mayer and Mayber (1989) an adaptation of germination and seedling survival under aerobic conditions also seems to exist in some rice varieties, but this is not desirable for seedling establishment. So after sowing the sprouted seeds into the field which is flooded, draining of water is essential and caution must be taken to avoid draining of sprouted seed along with water. If the seedlings are well anchored in the soil, water drain may affect them adversely. For this purpose, proper anchorage of seedlings is enabled by an external agent. The treatment of rice seeds with *C. caesia* leaves practiced by traditional farmers is aimed at the induction of secondary root formation and hence seedling anchorage is guaranteed.

Even though the chemical constituent of *C. caesia* leaves used in the present study is not analysed and characterised, it is presumed that the essential oils present in this plant is responsible for the induction or root growth. This view is indirectly confirmed by experimental plants treated with leaf extracts (T2 and T3) which did not exhibit much stimulatory effect as that of the cut leaf discs, because during grinding and filtration the essential oils get volatilised and escape, while that of cut leaves gradually escape and spread inside the Petri dishes giving stimulation to the germinating seeds. The essential oils of *C. caesia* consist of 10.5% of sesquiterpenes (Anonymous, 1950). Recently, it has been reported that a sesquiterpene caryophyllene isolated from the essential oils of *Cyperus rotundus* was shown to be efficient in inducing stimulated root growth in mung bean and wheat (Dhillon et al., 1993.)

The traditional use of *C. caesia* leaves to stimulate seed germination in rice is now scientifically confirmed and the stimulatory effect is attributed to the sesquiterpenes of *C. caesia*. However the biochemical isolation

and identification of the constituents of essential oils of this plant and their application on rice seed germination are under investigation by the present authors.

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### LEGEND TO FIGURES

Fig. 1-4 Effect of *Curcuma caesia* leaves on rice seed germination. Fig 1. a. Control, b. Seed treated with leachate, c. seed treated with 5% w/v extract. D. Seed treated with 10% w/v extract, e. Seed kept in between the leaf discs of *Curcuma caesia*. Fig.2 Control Fig 3. Seeds kept in between the leaf discs of *curcuma caesia* (upper leaf discs are removed in the photograph). Fig 4, Control (a) and the seed placed between the leaf discs of *C. caesia* (b).

**Table -1 EFFECT OF CURCUMA CAESIA LEAVES ON GERMINATION AND SECONDARY ROOT FORMATION IN RICE SEEDS**

	Germination %	Radicle Length cm	Secondary roots number
Control T1 T2 T3	100 100 100 100		30.9 ± 4.42 48.0 ± 3.24 48.0 ± 2.81
T4	100	4.7 4.8 4.3 4.2 7	56.7 ± 3.14 74.9 ± 4.87

C-Control, T<sub>1</sub> – Leachate, T<sub>2</sub>-Extract 5% w/v T<sub>3</sub>-Extract 5% w/v T<sub>4</sub>– Between leaf discs ± SE.

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