

Short communication

## **Effect of fertilizers on growth and development of seedlings of *Mesua ferrea* Linn**

**R TAIPODIA and ND SINGH\***

**O/o Deputy Commissioner, Anjaw District, Hawaii, Arunachal Pradesh**

**\*Krishi Vigyan Kendra West Kameng, Dirang 790101 Arunachal Pradesh**

Email for correspondence: rtaipodia@yahoo.com

### **ABSTRACT**

Treatments with diverse concentrations of ammonium nitrate and superphosphate were given to young seedlings of *Mesua ferrea* with a view to augment the seedling growth and productivity of the species. Length decreased in the seedlings treated with ammonium nitrate. While showing decrease in dry weight significant decrease was also observed in the shoot and root fresh weight which shows that ammonium nitrate has inhibitory effect on the growth of *M ferrea* seedlings. The interaction of sub-toxic levels of different elements in the soil may be accounted for the successive reduction in growth rate. The growth of roots was hampered by both ammonium nitrate and superphosphate at higher concentrations. While ammonium nitrate treated seedlings did not show noteworthy variation in shoot length at diverse concentration shoot growth was better under superphosphate treatment. Thus for enhanced establishment of *M ferrea* seedlings under nursery conditions the study suggests the use of >5% superphosphate and <1% ammonium nitrate.

**Keywords:** *Mesua ferrea*; ammonium nitrate; superphosphate; seedling; growth

*Mesua ferrea* Linn, the excel wood tree is found in profuse in the humid tropical belt of Arunachal Pradesh. However its germination and seedling growth rate in situ is found meager. Treatments with diverse concentrations of ammonium nitrate and superphosphate were given to young seedlings with a view to augment the seedling growth and productivity of the species.

Fully mature fruits of *M ferrea* were collected from the mother plants

during September 2012 for the test and instant processing was done to release the seeds. After soaking the seeds (measuring ca 4 g) in deionized water for 24 h seeds were wrapped with wet cloth for 12 h. One seed per polythene bag (15 x 10 cm) containing soil (pH- 5.3, organic carbon- 2.80%, total nitrogen- 0.26%, nitrate (N)- 2.22 g/g, ammonium (N)- 6.93 g/g, available phosphorus- 3.29 g/g, moisture content- 31.05%) was sown. Within 15 DAS the seeds germinated and the germination percentage was found to be 71 per cent.

The fertilizers doses were applied after 7 days of germination and when the seedlings had attained the height of 10 cm above the ground level. While using deionized water the ammonium nitrate and super-phosphate salts were diluted to 1, 2.5 and 5 per cent concentrations correspondingly. The treatment continued for 15 days while keeping the loading rate of each concentration at 20 ml per day per bag. As root coiling started seedlings were transplanted in the fields and thereafter the polythene bags were not used. Roots and shoot length (cm), fresh weight (g) and dry weight (g) were determined on the 15<sup>th</sup> day. In control the seedlings were treated with 20 ml/day water only and all the treatments were replicated thrice. For dry weight the plant material was dried in an oven at 80°C for 48 h. To contrast the mean values across diverse concentrations Turkey's test was used and linear regression was worked out (Zar 1974). The results are given in Table 1.

It is evident from the data that length decreased in the seedlings treated with ammonium nitrate. While showing decrease in dry weight significant decrease was also observed in the shoot and root fresh weight. It shows that ammonium nitrate has inhibitory effect on the growth of *M. ferrea* seedlings. The interaction of sub-toxic levels of different elements in the soil may be accounted for the successive reduction in growth rate. Lambert et al

(1994) also reported that excess supply of nutrient elements retard the growth of *Quercus macrocarpa*. The bounded relationships between water uptake and biomass accumulation can be understood from the synchronized decrease in fresh weight and dry weight in response to shoot and root length. While confirming this the plant length was significantly correlated with respective dry weight ( $Y = 25.64 + 18.57 X$ ,  $df=6$ ,  $r = 0.945$ ,  $P < 0.01$ ) irrespective of the treatments.

It is apparent from the data that increased concentration of soil solution which pushes the osmotic potential to a point where the growth and subsequently checks water absorption is due to the application of increased dose of salts. It is also evident that super-phosphate application normally increased the growth rate at all concentrations. Depending chiefly on the nutrient requisite of the plant the disparity in effect between these two inorganic fertilizers was ca 15 per cent. While seeking further trial substantiation it may be affirmed that with the application of super-phosphate *M. ferrea* seemed to grow well.

The growth of roots was hampered by both ammonium nitrate and superphosphate at higher concentrations. It is apparent that while ammonium nitrate treated seedlings did not show noteworthy variation in shoot length at diverse

## Fertilizers effect on *Mesua ferrea* seedlings

Table 1. Growth response of *Mesua ferrea* seedlings to ammonium nitrate and superphosphate treatments

| Parameter      | Ammonium nitrate (%) |       |       | Super phosphate (%) |       |        | Control |
|----------------|----------------------|-------|-------|---------------------|-------|--------|---------|
|                | 1                    | 2.5   | 5     | 1                   | 2.5   | 5      |         |
| <hr/>          |                      |       |       |                     |       |        |         |
| Length         |                      |       |       |                     |       |        |         |
| Root           | 8.39                 | 7.42  | 7.39  | 9.86                | 9.29  | 9.26   | 11.29   |
| Shoot          | 22.00                | 21.42 | 18.96 | 20.52               | 22.92 | 27.167 | 28.74   |
| <hr/>          |                      |       |       |                     |       |        |         |
| Fresh weight   |                      |       |       |                     |       |        |         |
| Root           | 0.58                 | 0.52  | 0.47  | 0.56                | 0.47  | 0.78   | 0.68    |
| Shoot          | 0.99                 | 0.60  | 0.49  | 1.04                | 1.24  | 1.60   | 1.62    |
| <hr/>          |                      |       |       |                     |       |        |         |
| Dry weight     |                      |       |       |                     |       |        |         |
| Root           | 0.21                 | 0.17  | 0.15  | 0.19                | 0.27  | 0.27   | 0.23    |
| Shoot          | 0.39                 | 0.33  | 0.33  | 0.47                | 0.41  | 0.59   | 0.60    |
| <hr/>          |                      |       |       |                     |       |        |         |
| R/S (length)   | 0.49                 | 0.46  | 0.51  | 0.59                | 0.52  | 0.45   | 0.50    |
| <hr/>          |                      |       |       |                     |       |        |         |
| R/S (fresh wt) | 0.63                 | 0.93  | 1.04  | 0.57                | 0.42  | 0.56   | 0.47    |
| <hr/>          |                      |       |       |                     |       |        |         |
| R/S (dry wt)   | 0.49                 | 0.42  | 0.34  | 0.35                | 0.65  | 0.45   | 0.36    |

Values are means of three replications

concentration shoot growth was better under superphosphate treatment. Thus for enhanced establishment of *M ferrea* seedlings under nursery conditions the present study suggests the use of >5% superphosphate and <1% ammonium nitrate.

## REFERENCES

- Lambert F, Traux B, Gagnon D, Chevrier D and Cjhevrier N 1994. Growth and N nutrition, monitored by enzyme assays, in a hardwood plantation: effects of mulching materials and glycophosphate application. *Forest Ecology and Management* **70**: 231 -244.
- Zar JH 1974. *Biostatistical analysis*. 2<sup>nd</sup> edition, Prentice Hall, Englewood Cliffs, New Jersey.

*Received: 07.01.14*

*Accepted: 17.02.14*