*Indian Journal of Natural Rubber Research*, **14**(2) :142 - 145, 2001.

# EFFECT OF AGROCLIMATE OF MIZORAM ON EARLY ESTABLISHMENT OF *HEVEA* IN POLYBAGS

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Singh, R.P., Mandal, D., Chaudhuri, D. (2001).. Effect of agroclimate of Mizoram on early establishment of *Hevea* in polybags. *Indian Journal of Natural Rubber Research*, **14**(2) : 142 - 145.

A nursery experiment was conducted for two consecutive years with a view to study the effects of agroclimate on sprouting success and growth of two popular *Hevea* clones *viz.* RRIM 600 and RRII 105. Budded stumps of these clones were planted in the second week of every month consecutively for two years. The sprouting success and growth parameters recorded showed wide variations. Maximum air temperature and sunshine hours had a positive effect on sprouting and growth. The more favourable period for planting budded stumps in polybags was from March to May under the agroclimatic conditions of Mizoram.

Key words : Agroclimate, Budded stumps, *Hevea brasiliensis*, Mizoram.

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## INTRODUCTION

Vegetative propagation of rubber (*Hevea brasiliensis*) through budgrafting followed by raising the budded stumps in polybags and finally transplanting the plants to the field is the accepted agronomical practice. Successful establishment of *Hevea* in polybag nursery is influenced by the environment, soil physico-chemical properties *etc.* In Mizoram, attempts have been made to cultivate rubber for the last two decades. However, no systematic study has so far been carried out to assess the influence of various climatic factors on sprouting success and subsequent growth of plants in the polybags. The present study was undertaken to identify the time best suited for planting budded stumps in polybags and to observe the influence of agroclimatic factor(s) on their growth.

## MATERIALS AND METHODS

Rubber seedlings raised in a nursery at Tuichhuihan Farm, Regional Research Station of the Rubber Research Institute of India at Kolasib in Mizoram during August/ September 1992 and 1993, were used as stock plants for the study. Two popular clones, RRIM 600 and RRII 105 were used as scion material for budding. Brown budding was done on 16 months old seedlings. Budded stumps of each clone were planted in polybags in the second week of every month for two consecutive years. The experiment was laid out in a completely randomized design with fifty polybag plants per clone. Watering, manuring and other routine cultural practices were carried out as per recommendations (Rubber Board, 1990). Data on sprouting was recorded at an interval of fifteen days for each clone and continued up to a period of 150 days. Morphological parameters at 150 days after planting in polybags were also recorded from the sprouted plants. The data was subjected to angular transformation for analysis of variance (Gomez and Gomez, 1984). Agrometeorological parameters like rainfall, relative humidity, sunshine hours and mean air temperature were recorded during the experimental period.

## RESULTS AND DISCUSSION

There were significant differences in the coefficient of variation among the months, years and month x year interaction on the successful establishment of polybag plants. The sprouting success of two *Hevea* clones are tabulated in Tables 1 and 2 respectively. The budded plants planted during November to January started sprouting within 60 days and continued to sprout till 150 days. However, the stumps planted during February to July sprouted within 30 days and completed sprouting by 90 days. The stumps planted between August to October showed irregular sprouting. Significant difference in sprouting was observed for both the clones. Maximum sprouting was observed when the stumps were planted in polybags during February to May for clone RRIM 600 and February to June for clone RRII 105, possibly due to the prevalence of favourable agroclimate during that period (Sethuraj *et al.*, 1989). A gradual reduction in sprouting was noticed for plantings from June onwards with the minimum for stumps planted during November and December. These months coincide with the onset of cold and dry period, which may have adversely affected the sprouting and growth (Mandal *et al.*, 1998, 1999). Effect of climatic factors on establishment of plants in polybag nursery

Table 1. **Periodic sprouting (%) of polybag plants of clone RRIM 600**

| Month of planting in polybags | Sprouting (%) after days | | | | | | |
|---|---|---|---|---|---|---|---|
| | 30 | 60 | 90 | 120 | 150 | Total | Mean |
| January | - | 40 | 08 | 04 | - | 52 | 58 |
| | (-)* | (46) | (10) | (06) | (02) | (64) | |
| February | 52 | 10 | - | - | - | 62 | 74 |
| | (50) | (36) | (-) | (-) | (-) | (86) | |
| March | 34 | 24 | - | - | - | 58 | 69 |
| | (48) | (32) | (-) | (-) | (-) | (80) | |
| April | 50 | 04 | 02 | - | - | 56 | 66 |
| | (46) | (16) | (14) | (-) | (-) | (76) | |
| May | 22 | 16 | 10 | - | - | 48 | 64 |
| | (28) | (40) | (12) | (-) | (-) | (80) | |
| June | 22 | 18 | 10 | - | - | 50 | 55 |
| | (26) | (24) | (10) | (-) | (-) | (60) | |
| July | 22 | 08 | 12 | 10 | - | 52 | 61 |
| | (18) | (32) | (20) | (-) | (-) | (70) | |
| August | 24 | 12 | 08 | - | - | 44 | 48 |
| | (20) | (18) | (10) | (04) | (-) | (52) | |
| September | 16 | 16 | 05 | 04 | - | 41 | 44.5 |
| | (14) | (28) | (06) | (-) | (-) | (48) | |
| October | 16 | 14 | 06 | 02 | - | 38 | 41 |
| | (14) | (14) | (09) | (07) | (-) | (44) | |
| November | - | 06 | 06 | 08 | 12 | 32 | 34 |
| | (-) | (10) | (06) | (16) | (04) | (36) | |
| December | - | - | 08 | 10 | 09 | 27 | 30 |
| | (-) | (-) | (16) | (14) | (03) | (33) | |

* Figures in parentheses show sprouting success (%) during 2nd year

Table 2. **Sprouting (%) of polybag plants of clone RRII 105**

| Month of planting in polybags | Sprouting (%) after days | | | | | | |
|---|---|---|---|---|---|---|---|
| | 30 | 60 | 90 | 120 | 150 | Total | Mean |
| January | - | 24 | 18 | - | - | 42 | 48 |
| | (-)* | (46) | (10) | (-) | (-) | (54) | |
| February | 40 | 22 | - | - | - | 62 | 71 |
| | (32) | (40) | (08) | (-) | (-) | (80) | |
| March | 48 | 18 | - | - | - | 66 | 71 |
| | (44) | (32) | (-) | (-) | (-) | (76) | |
| April | 34 | 20 | 10 | - | - | 64 | 65 |
| | (40) | (18) | (08) | (-) | (-) | (66) | |
| May | 22 | 26 | 16 | - | - | 64 | 67 |
| | (30) | (30) | (10) | (-) | (-) | (70) | |
| June | 24 | 32 | 4 | - | - | 60 | 62 |
| | (34) | (26) | (04) | (-) | (-) | (64) | |
| July | 18 | 26 | 10 | - | - | 54 | 56 |
| | (16) | (34) | (06) | (02) | (-) | (58) | |
| August | 20 | 16 | 12 | - | - | 48 | 54 |
| | (24) | (26) | (10) | (-) | (-) | (60) | |
| September | 26 | 16 | - | - | - | 42 | 45 |
| | (24) | (08) | (06) | (04) | (-) | (42) | |
| October | 24 | 10 | 04 | - | - | 38 | 40 |
| | (24) | (08) | (06) | (04) | (-) | (42) | |
| November | - | 08 | 16 | 05 | 04 | 33 | 34 |
| | (-) | (10) | (08) | (04) | (10) | (35) | |
| December | - | - | 12 | 02 | 16 | 30 | 35 |
| | (-) | (-) | (26) | (10) | (04) | (40) | |

* Figures in parentheses show sprouting success (%) during 2nd year

Table 3. **Effect of climatic factors on sprouting success**

| Factors | Season | | | |
|---|---|---|---|---|
| | Summer (Mar-May) | Monsoon (June-Sept) | Cool (Oct-Nov) | Cold (Dec-Feb) |
| Rainfall (mm) | 177.1 | 356.8 | 74.7 | 34.8 |
| R.H. (%) | 74.6 | 83.1 | 80.4 | 74.2 |
| Max. Temp.(°C) | 33.6 | 32.9 | 29.7 | 26.1 |
| Min. Temp. (°C) | 19.4 | 24.6 | 18.8 | 10.1 |
| Sunshine (hours) | 6.2 | 3.8 | 5.3 | 4.5 |
| Sprouting (%) | | | | |
| RRIM 600 | 68.02 | 45.25 | 34.50 | 54.33 |
| RRII 105 | 67.33 | 59.01 | 32.50 | 51.83 |

Table 4. **Morphological parameters of polybag plants of *Hevea* (150 days after planting)**

| Months of planting in polybags | Girth (cm) | | Height (cm) | | Leaves (No.) | | Whorls (No.) | |
|---|---|---|---|---|---|---|---|---|
| | I | II | I | II | I | II | I | II |
| January | 2.03 | 2.26 | 45.40 | 43.90 | 26.45 | 23.95 | 2.05 | 2.05 |
| February | 2.45 | 2.43 | 62.55 | 54.70 | 34.05 | 29.55 | 3.70 | 3.70 |
| March | 2.42 | 2.12 | 61.05 | 54.70 | 33.55 | 29.50 | 3.55 | 3.35 |
| April | 2.51 | 2.46 | 63.65 | 56.30 | 34.05 | 30.75 | 3.30 | 3.10 |
| May | 2.61 | 2.14 | 59.65 | 46.10 | 33.20 | 29.90 | 3.25 | 3.00 |
| June | 2.53 | 2.39 | 63.80 | 54.20 | 32.25 | 29.05 | 3.55 | 3.05 |
| July | 2.58 | 2.52 | 51.20 | 41.70 | 30.20 | 27.10 | 3.40 | 2.95 |
| August | 2.37 | 2.26 | 47.05 | 47.20 | 30.40 | 26.40 | 2.85 | 2.55 |
| September | 2.06 | 2.03 | 44.65 | 41.60 | 30.10 | 25.55 | 3.00 | 2.55 |
| October | 2.10 | 1.93 | 43.05 | 44.65 | 28.35 | 26.65 | 2.40 | 2.50 |
| November | 2.04 | 2.10 | 42.75 | 38.65 | 28.35 | 26.05 | 2.40 | 2.80 |
| December | 1.85 | 2.01 | 44.60 | 41.50 | 29.55 | 25.75 | 2.25 | 2.15 |
| Sem± | 0.01 | 0.06 | 1.23 | 1.10 | 0.80 | 0.69 | 0.11 | 0.05 |
| CD (at 5%) | 0.02 | 0.18 | 3.82 | 3.40 | 2.47 | 2.13 | 0.31 | 0.16 |

I = RRIM 600; II = RRII 105

during different seasons are presented in Table 3. For both the clones maximum sprouting was observed during the summer season (March to May) when plants received adequate rain and optimum day temperature together with sufficient sunlight. Minimum sprouting was noticed during the cool period (October and November) for both the clones. Morphological data for the two clones are given in Table 4. Significant difference in girth, height and number of leaves and whorls were observed for both the clones. Growth of both the clones were found to be better when they were planted in polybags during February to June. Simple correlation between morphological parameters and agroclimatic factors are shown in Table 5. Positive and significant correlation between girth and maximum air temperature was observed for the clone RRIM 600. Bright sunshine hours was significantly correlated with plant height and number of leaves for both the clones. Relative humidity was found negatively correlated with all the morphological parameters studied for both the clones.

It can be concluded that under the agroclimatic conditions of Mizoram, the optimum time for planting budded stumps in polybags for raising *Hevea* plants is March to May. Such plants can be transplanted to the field during August to September of the same year.

## ACKNOWLEDGEMENT

The authors are extremely grateful to Dr. Y. Annamma Varghese, former Project Co-ordinator, NERC, Agartala and Sri. Jacob Pothen, Deputy Director, CES, Chethackal for their encouragements. Thanks are also due to Dr. S.K. Dey, Deputy Director, RRS, Agartala and Dr. G.C. Mondal, RRS, Guwahati for helpful discussion.

Table 5. **Correlation between agroclimatic and morphological parameters**

| Meteorological parameters | Girth | | Height | | Leaves | | Whorls | | Sprouting (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | I | II | I | II | I | II | I | II | I | II |
| Max. Temp. | 0.66 * | 0.39 | 0.38 | 0.34 | 0.39 | 0.54 * | 0.59 * | 0.36 | 0.56 * | 0.54 * |
| Min. Temp. | 0.45 | 0.24 | 0.06 | 0.02 | 0.10 | 0.22 | 0.37 | 0.15 | 0.02 | 0.12 |
| R.H. | -0.03 | -0.05 | -0.38 | -0.32 | -0.34 | -0.26 | -0.01 | -0.17 | -0.38 | -0.29 |
| Sunshine | 0.21 | 0.37 | 0.52 * | 0.58 * | 0.58 * | 0.57 * | 0.28 | 0.47 | 0.55 * | 0.51 * |
| Rainfall | 0.41 | 0.25 | -0.03 | -0.04 | 0.28 | 0.10 | 0.29 | 0.11 | 0.09 | 0.11 |

I = RRIM 600; II = RRII 105 * Significant at $P \leq 0.05$

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