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# Response of *Derris elliptica* Cuttings to Different Soil Media

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**Abstract:- Insects attacked agricultural crops and carries plant diseases lead to damage the crops and decrease income of the farmers. The best control of this problem is to promote organic insecticide. *Derris elliptica* is a climbing leguminous plant has rotenone substances used as organic insecticide to control insects attacked the agricultural crops. This plant could be planted by use of cuttings, however there is no study on the specific soil media favored on the growth performance of *Derris elliptica* cuttings. Hence this study on response of *Derris elliptica* cuttings to different soil media was conducted. The objectives of this study were determined the percent survival of the cuttings, length of shoots and number of roots produced as affected by the different soil media.**

**The study was laid out in a Randomized Complete Block Design (RCBD). Results of the study revealed that the soil media 25% garden soil + 75% sand, 50% garden soil + 25% rice hull + 25% sand and 100% garden soil were significantly favored to the percent survival, length of shoots and number of roots of *Derris elliptica* cuttings.**

***Keywords:-*** *Derris elliptica, Response, Cuttings, Soil Media & Randomized Complete Block Design.*

## I. INTRODUCTION

Insect pests inflict damage to humans, farm animals and crops. They have been defined by Williams (1947) as any insect in the wrong place. Provision of food has always been a challenge facing mankind. A major cornerstone in this challenge is the competition from insect pests. Particularly in the tropics and sub-tropics, where the climate provides a highly favourable environment for a wide range of insects, massive efforts are required to suppress population densities of the different pests in order to achieve an adequate supply of food. In the developing countries, the problem of competition from insect pests is further complicated with a rapid annual increase in the human population (2.5-3.0 percentage) in comparison to a 1.0 percentage increase in food production. Taking into consideration sudden problems caused by drought in places such as Africa, considerable losses of agricultural products add a serious burden to people's daily life. The introduction of alien pests into new habitats due to the global increase of trade and transport causes another dilemma. When a pest is carried to a new geographical area, its natural enemies that keep it in check in its aboriginal home are normally left behind. This situation, in most cases, may lead to critical complications. One major example is the introduction of the spotted stemborer, *Chilo partellus* Swinhoe, into Africa coming from Asia early this century, that is now responsible for significant losses in maize and sorghum in many parts of Eastern and Southern Africa. The exotic pest may have also led to partial displacement of the native African stemborers such as *Sesamia calamistis* Hampson, *Chilo orichalcociliellus* Strand and *Busseola fusca* (Fuller) (Kfir, 1997). These problems are also experienced by most countries in Asia particularly the country Philippines. One of the best solution of this existing problem in production of agricultural crops is to promote *Derris elliptica* vines as natural insecticides. *Derris elliptica* is a large climber that is mainly cultivated in the tropics for its roots as source of Rotenone and known to be invasive in Fiji and western Polynesia (PIER, 2000). Rotenone and its congeners have come into increasingly widespread usage as the active constituents of a large number of insecticides (Gunther, 1945). This is cultivated in the tropics for the insecticide Rotenone which is derived from the roots of the plant (Bailey and Bailey 1976). It has also been used as a fish poison (GRIN, 2002). And highly toxic to a wide range of insect pests such as aphids, beetles, borers, diamond black moth, fruit flies, trips, cabbage worms, fleas, flea beetles, lice, loppers, mites, mosquitoes, psyllids and slugs (Tacio, 2009). However, this information is still unavailable to the farmers in most provinces of the Philippines and consequently from other countries. Presently, there is no study on the response of *Derris elliptica* cuttings planted in different soil media since soil media defined by Rani et al., (2015) & Baron (2015) as a source of nutrients that will gradually available & considered as an integral part of propagation and percentage rooting and quality of roots produced are directly influenced by the medium hence this study was conducted.

## II. OBJECTIVES OF THE STUDY

The objectives of this study were determined the percent survival of the cuttings per plant, length of shoots plant and number of roots produced per plant as affected by the soil media.

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## III. METHODOLOGY

### *A. Research Design*

The study was laid out in a Randomized Complete Block Design (RCBD) consisting of six treatments replicated four times. Each replicate contained five experimental pots. A total of 120 *Derris elliptica* cuttings were used.

### *B. Experimental Lay Out*

| | | | |
|---|---|---|---|
| **$T_6$** | **$T_2$** | **$T_6$** | **$T_4$** |
| **$T_4$** | **$T_4$** | **$T_5$** | **$T_6$** |
| **$T_2$** | **$T_5$** | **$T_1$** | **$T_2$** |
| **$T_1$** | **$T_6$** | **$T_3$** | **$T_1$** |
| **$T_5$** | **$T_3$** | **$T_4$** | **$T_5$** |
| **$T_3$** | **$T_1$** | **$T_2$** | **$T_3$** |

Table 1

Legend:

- $T_1$ - 25% garden soil + 75% sand
- $T_2$ - 50% garden soil + 25% rice hull + 25% sand
- $T_3$ - 50% garden soil + 50% sand
- $T_4$ - 75% garden soil + 25% sand
- $T_5$ - 100% sand
- $T_6$ - 100% garden soil (control)

Fig 1:- Presents the experimental lay out of the study

### *C. Experimental Procedure*

Soil media preparation. Sand soil was taken from the river of P1 – Upper Libas, Tagana-an, Surigao Del Norte. Rice hull was taken from San Isidro Rice Mill of San Isidro, Placer, Surigao Del Norte. And garden soil was taken from SSCT-MAINIT CAMPUS nursery area. The collected soil media were screened by use of fish net and removed all big particles.

Potting bed preparation. Suspended bed was prepared 1 m above from the ground 6 m wide & 16 m length. Mixed soil media were placed in a holed garden poly ethylene pots for the drainage system of the excessed water during the irrigation period.

Stem cutting collection. The *Derris elliptica* cuttings were matured as suggested by Abidin et al. (2017) and collected from the river side of P1-Upper Libas, Taganaan, Surigao Del Norte. Collected cuttings were measured 8 - 10 inches long as suggested by (Farooq, et al., 2018) with a diameter of 20 mm and had 5 nodes. Then they were covered by the banana leaves and were placed in a pail with ½ filled of water before they were transported to the nursery area to avoid stress.

Planting. The collected cuttings were planted in a polyethylene pots with 4 x 8 inches. Before plantation all the cuttings were showered thoroughly with water to retain the moisture and prevent it from drying (Farooq, et al., 2018). Three nodes from the bottom of the cuttings were buried and pressed the upper portion of the soil near the brim of poly ethylene pots.

Irrigation management. Right after planting of the cuttings follow up irrigation was done using water mist type of irrigation to make the cuttings survive and not stress on the impact of the water. Next irrigation was done morning and afternoon during sunny days.

Monitoring. Daily monitoring of the research area was done daily to secure from the destruction of the livestock and typhoon.

Weeding. This was done two weeks from planting. Removed manually the growing unwanted plants. Next weeding activity was done 3 weeks interval to avoid stressed the cuttings.

Fertilizer application. This was done two months from planting 3 table spoons of complete fertilizer (14-14-14) were diluted in 1,000 ml of water then 1 glass of diluted complete fertilizer was poured per plant.

Insecticide application. This was done one month from planting 2 glasses of extracted juice of *Gliricidia sepium* leaves were diluted in 500 ml water & were sprayed to the planted *Derris elliptica* cuttings.

❖ *Data Gathered.*

The data were collected 90 days after planting DAP.

➢ Percent Survival 90 Days after Planting (DAP). This was determined by dividing the number of cuttings that survived to the total number of cuttings planted multiplied by x 100. This was computed using this formula:

$$S\,(\%) = \frac{NSC}{TNCP} \times 100$$

Where S – Percentage Survival
NSC – Number of Survival Cuttings
TNCP – Total Number of Cuttings Planted

➢ Length of shoots. This was done by means of measuring the length of shoots per plant using the ruler.

➢ Number of roots. This was done by means of counting the longest/primary roots per plant.

❖ *Data Analysis*

All the data gathered were summarized, presented and subjected for analysis of variance (ANOVA) in RCBD. Treatment means were compared using the Least Significant Difference Test (LSD).

## IV. RESULTS AND DISCUSSION

*A. Percent Survival (%).*

Table 1 and Figure 2 present the percentage survival (%) 90 DAP of *Derris elliptica* cuttings as affected by the different soil media. The highest percentage survival were the cuttings planted in 50% garden soil + 25% rice hull + 25% sand with a mean of (90%) followed by the cuttings planted in 25% garden soil + 75% sand with a mean of (80%), cuttings planted in 100% garden soil (control) with a mean of (80%) and the lowest survival percentage were observed the cuttings planted in 50% garden soil + 50% sand with a mean of (50%).

Statistical analysis showed that there was significant effect of soil media on the percent survival of *Derris elliptica* cuttings. Comparison among means revealed that cuttings planted in 50% garden soil + 25% rice hull + 25% sand, 25% garden soil + 75% sand and in 100% garden soil were comparable with each other and significantly higher percentage survival over the cuttings planted in 50% garden soil + 50% sand.

This implies that the 50% garden soil + 25% rice hull + 25% sand, 25% garden soil + 75% sand and 100% garden soil media favored on the survival percentage of *Derris elliptica* cuttings.

| Treatments | Percent Survival (%) |
|---|---|
| $T_1$ | 80 ab |
| $T_2$ | 90 a |
| $T_3$ | 50 c |
| $T_4$ | 70 b |
| $T_5$ | 69 bc |
| $T_6$ | 80 ab |

Table 2:- Percent Survival (%) of *Derris elliptica* cuttings as affected by the different soil media 90 DAP.

* Means with the same letter are not significantly different at 0.05 (LSD)

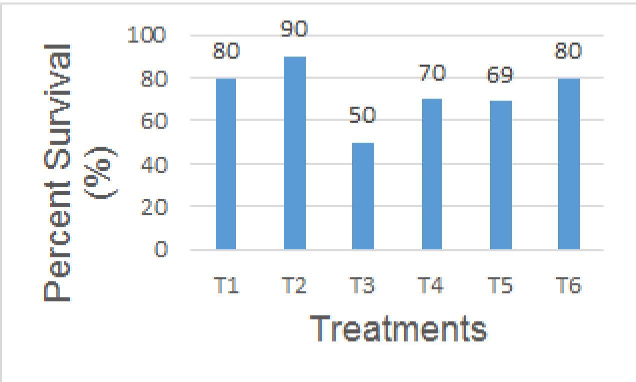


Fig 2:- Percent Survival (%) of *Derris elliptica* cuttings as affected by the different soil media 90 DAP.

*B. Length of Shoots (cm).*

Table 3 and Figure 3 present the length of shoot per plant of *Derris elliptica* cuttings as affected by the different soil media. The highest length of shoot (cm) were observed from the cuttings planted in 25% garden soil + 75% sand with a mean of (3.93 cm), followed by the cuttings planted in 100% garden soil (control) with a mean of (1.96 cm) and the lowest length of shoots were observed from the cuttings planted in 50% garden soil + 50% sand with a mean of (0.47 cm).

Statistical analysis revealed that there was significant effect of soil media on the length of shoot of *Derris elliptica*. Comparison among means revealed that cuttings planted 25% garden soil + 75% sand, 50% garden soil + 25% rice hull + 25% sand and 100% garden soil (control) were comparable with each other and significant higher over the cuttings planted in 50% garden soil + 50% sand, 75% garden soil + 25% sand and 100% sand.

This implies that 25% garden soil + 75% sand, 50% garden soil + 25% rice hull + 25% sand and 100% garden soil (control) soil media favored on the length of shoots of *Derris elliptica* cuttings.

| Treatment | Length of Shoots (Cm) |
|---|---|
| $T_1$ | 3.93a |
| $T_2$ | 1.62ab |
| $T_3$ | 0.47b |
| $T_4$ | 0.85b |
| $T_5$ | 0.20b |
| $T_6$ | 1.96ab |

Table 3:- Length of shoots (cm) of *Derris elliptica* as affected by soil media 90 DAP.

* Means with the same letter are not significantly different at 0.05 (LSD)

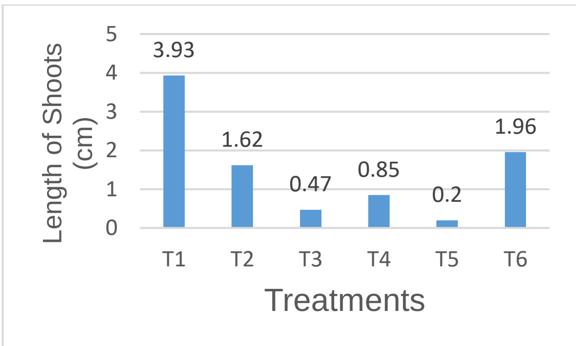


Fig 3:- Length of Shoots of Derris elliptica as affected by soil media 90 DAP

*C. Number of Roots.*

Table 4 and Figure 4 present the number of roots of *Derris elliptica* cuttings as affected by the different soil media. The highest number of roots were observed from the cuttings planted in 25% garden soil + 75% sand with a mean of (17.00), followed by the cuttings planted in 50% garden soil + 25% rice hull + 25% sand with a mean of

(16.00) while the lowest number of roots were observed from the cuttings planted in 50% garden soil + 50% sand with a mean of (4.00).

Statistical analysis revealed that there was significant effect of soil media on the number of roots of *Derris elliptica* cuttings. Comparison among means revealed that cuttings planted in 25% garden soil + 75% sand, 50% garden soil + 25% rice hull + 25% sand and 100% garden soil were comparable with each other and significant higher number of roots over the cuttings planted in 50% garden soil + 50% sand.

This implies that the soil media 25% garden soil + 75% sand, 50% garden soil + 25% rice hull + 25% sand and 100% garden soil favored on the development and production of roots per plant of *Derris elliptica*. Farooq, et al., (2018) explained that a potting or growing medium is a substrate where roots of the plants grow and extract nutrients and water from medium, helps in the production of healthy seedlings in containers and bare root production and serve as the sole source of nutrition for the plants.

| Treatments | Number of Roots |
|---|---|
| $T_1$ | 17.00 a |
| $T_2$ | 16.00 a |
| $T_3$ | 4.00 c |
| $T_4$ | 10.00 b |
| $T_5$ | 8.00 b |
| $T_6$ | 11.00 ab |

Table 4:- Number of roots of *Derris elliptica* cuttings as affected by the different soil media 90 DAP.

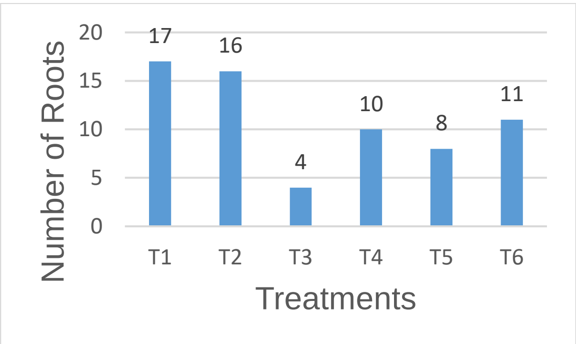


Fig 4:- Number of roots of *Derris elliptica* as affected by the different soil media 90 DAP.

## V. CONCLUSIONS

It is therefore concluded that the soil media 25% garden soil + 75% sand, 50% garden soil + 25% rice hull + 25% sand and 100% garden soil were favored on the percent survival, length of shoots and number of roots of *Derris elliptica* cuttings.

## VI. RECOMMENDATIONS

Based on the above findings, the following recommendations were derived: 50% garden soil + 25% rice hull + 25% sand is strongly favored on the percent survival of the *Derris elliptica* cuttings. 25% garden soil + 75% sand is strongly favored on the length of shoots & number of roots per plant of *Derris elliptica* cuttings.

Conduct related study with the application of rooting hormone and extend the study into 150 days or more.

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