

## Potential of *Elaeis guineensis* Jacq. as An Agroforestry Tree and its Compatibility with Maize (*Zea mays* L.)

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### INTRODUCTION & AIM

Agroforestry involves the intentional integration of trees with crops and/or animals to achieve multiple benefits

from shared management. Its success is largely influenced by selecting compatible tree species, such as *Acacia*

*mangium* and *Khaya nyasica*, which are valued in African agroforestry systems for their adaptability and

ecosystem benefits. A key aspect of optimizing these is understanding allelopathy- the production of biochemical

by an organism that can positively or negatively impact the growth and survival of other species.

This process is important for aligning tree-crop relationships in agroforestry.

This study aims to examine the allelopathic effects of *Elaeis guineensis* Jacq. (Oil palm) on the germination of

*Zea mays* L. (maize). *Elaeis guineensis*, widely known as oil palm, is a crucial source of palm oil and has

significant economic importance. Meanwhile, *Zea mays* L., or maize is a globally cultivated food crop, ranking

as the third-largest plant-based food source. Understanding how these species interact in agroforestry systems

could enhance productivity and sustainability, providing valuable insights for maximizing their combined

potential.

### METHOD

Study Area: David Okali Wood Laboratory, University of Ibadan, Ibadan, Nigeria.

Design: Completely Randomized design (CRD).

Collection of seeds

Seed float test

Collection of fresh leaves of selected tree species

Conversion of leaf to leachate

Addition of leachate to seeds

Measurement of seed variables over a number of days

Sorting, Cleaning, and analysis of data using analysis software like SPSS

Figure 1: Methodology Flowchart.



Figure 2: Maize seedling germination after the 3rd day of planting at 5% leachate treatment.



Figure 3: Maize seedling germination after the 3rd day of planting at 10% leachate treatment.

### RESULTS & DISCUSSION

Table 1: Allelopathic potential Effect of *Elaeis Guineensis* jacq on maize seedling growth after 9 days of planting

Leachate Concentration (%)	Number of Leaves ± SE	Shoot Length (cm) ± SE	Root Length (cm) ± SE	Shoot Fresh Weight (g) ± SE	Root Fresh Weight (g) ± SE	Shoot Dry Weight (g) ± SE	Root Dry Weight (g) ± SE	Seedling Vigour Index ± SE
0 (Control)	1.150 ± 0.244 <sup>a</sup>	5.715 ± 1.290 <sup>a</sup>	5.945 ± 1.226 <sup>b</sup>	5.702 ± 1.115 <sup>b</sup>	6.246 ± 1.190 <sup>a</sup>	0.639 ± 0.116 <sup>b</sup>	0.566 ± 0.110 <sup>c</sup>	12.182 ± 2.321 <sup>a</sup>
5% Leachate	2.000 ± 0.271 <sup>b</sup>	8.100 ± 0.887 <sup>a</sup>	15.925 ± 1.890 <sup>b</sup>	6.726 ± 0.902 <sup>a</sup>	10.788 ± 1.511 <sup>c</sup>	3.126 ± 0.390 <sup>b</sup>	5.708 ± 0.763 <sup>c</sup>	23.966 ± 2.750 <sup>a</sup>
10% Leachate	1.950 ± 0.246 <sup>b</sup>	8.665 ± 1.022 <sup>a</sup>	16.080 ± 2.058 <sup>a</sup>	7.738 ± 1.226 <sup>b</sup>	8.203 ± 0.996 <sup>bc</sup>	0.571 ± 0.069 <sup>a</sup>	0.942 ± 0.125 <sup>b</sup>	30.886 ± 3.425 <sup>b</sup>
20% Leachate	1.350 ± 0.274 <sup>ab</sup>	5.855 ± 0.936 <sup>a</sup>	6.885 ± 1.105 <sup>a</sup>	2.869 ± 0.444 <sup>b</sup>	2.649 ± 0.442 <sup>b</sup>	2.605 ± 0.435 <sup>a</sup>	2.829 ± 0.438 <sup>a</sup>	11.122 ± 1.846 <sup>b</sup>
P value (≤ 0.05)	0.004*	0.111ns	0.005*	0.000*	0.000*	0.000*	0.000*	0.000*

Table 2: Allelopathic potential Effect of *Elaeis Guineensis* jacq on germination

Leachate concentration (%)	Mean Germination Time (MGT) ± SE	Days of First Seed Germination (DFSG) ± SE	Mean Germination Percentage (MGP) (%) ± SE
0 (Control)	1.750 ± 0.629 <sup>a</sup>	1.150 ± 0.50 <sup>a</sup>	60.00 ± 21.602 <sup>a</sup>
5% Leachate	2.250 ± 0.250 <sup>a</sup>	2.00 ± 0.00 <sup>a</sup>	85.00 ± 9.574 <sup>a</sup>
10% Leachate	2.00 ± 0.408 <sup>a</sup>	2.00 ± 0.00 <sup>a</sup>	85.00 ± 9.574 <sup>a</sup>
20% Leachate	2.250 ± 0.957 <sup>a</sup>	2.00 ± 0.00 <sup>a</sup>	73.75 ± 12.479 <sup>a</sup>
P-value (≤ 0.05)	0.492	0.214	0.270

Table 3: Correlation Coefficient (r) associating Seedlings Vigour Index (SVI) and Seedling growth and germination parameters.

Seedlings Growth Parameters	Correlation Coefficients (r)	P-value (≤ 0.05)
Number of leaves	0.177	0.177
Shoot Length (cm)	0.201	0.000*
Root Length (cm)	0.226	0.000*
Shoot Fresh Weight (g)	-0.040	0.485
Root Fresh Weight (g)	-0.040	0.476
Shoot Dry Weight (g)	-0.048	0.403
Root Dry Weight (g)	-0.046	0.421
Mean Germination Time (MGT)	0.396	0.129
Mean Germination Percentage (MGP)	0.428	0.098
Days of First Seed Germination (DFSG)	0.424	0.102

### CONCLUSION

- This study shows that *Elaeis guineensis* Jacq. has a stimulatory effect on *Zea mays* L. seed germination when used moderately at leachate concentrations of 5% and 10% respectively.
- This study aids sustainable and eco-friendly agricultural practices by identifying and using beneficial tree species.

### FUTURE WORK / REFERENCES

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