

## Effect of Soil Mixing with Organic Residues on Some Physical Properties of Soil and Plant Growth

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### ABSTRACT

The effect of soil mixing with various organic materials on the physical properties of soil and plant growth was studied in the nursery of the Experimental Station of Al-Fateh University in Tripoli, Libya in 1978-1979.

Water holding capacity (WHC), and aeration porosity (AP) are the two main physical properties in consideration, both were effectively altered by soil mixing. The best results were obtained by adding 50% peat moss to 50% sand (M<sub>3</sub>). WHC has increased from approximately 10% by volume in M<sub>1</sub> to approximately 35% in M<sub>3</sub>. AP was reduced by mixing from approximately 17% on volume basis for M<sub>1</sub> to approximately 9% in M<sub>3</sub>. As for the best plant growth M<sub>3</sub> is selected for growing *Eucalyptus camalgulensis* Dehn. For stronger and better stands; however, M<sub>9</sub> (50% sand + 50% peat moss + compound fertilizer + fish meal) is preferred. If sawdust is used as a substitute for the imported peat moss, it should be treated with urea before being incorporated into the mixture.

### INTRODUCTION

The sandy soils used as a growing media in most of the nurseries in Libya, is not satisfactory for the production of high quality plant (10). Sand cultures are expensive media because of its low retention of moisture and nutrients. Hartmann and Kester (6) stated that sand contains virtually no mineral nutrients and has no buffering capacity. It is therefore used mostly in combination with organic materials. Mahdi and Sallam (9) reported that the incorporation of peat moss with sandy soils provides media with better physical conditions, yet because of their low level of nutrients, these mixtures are not the ideal media for the propagation of ornamental plants. Therefore, macro and micro nutrients should be added. Water holding capacity and aeration porosity are the most important physical properties to be altered by soil mixing. The mixtures of loamy soil, sand and peat are used to provide well aerated media for germination (6). Cowan (3) reported that when sawdust was mixed with peat and sand they form a successful rooting media for the nursery. The distribution and rate of

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growth of forest stands are influenced by soil physical, chemical and biological properties (5). The addition of NPK fertilizers assures a successful stand and better growth. Cromer (4) found that the application of N and P fertilizers to various *Eucalyptus* species had increased the growth.

Many attempts were made to improve both the physical and chemical properties of sandy soils. Soil mixing by adding organic residues is one of those attempts. The objectives of this study were:

1. To compare the effectiveness of the different materials used for mixing.
2. To find the best mixing ratio for best plant growth.
3. To test the nutritional status of these mixtures by comparing the growth in the non fertilized mixtures with the fertilized one.

## MATERIALS AND METHODS

This experiment was carried out in the nursery of the Experimental Station of the Faculty of Agriculture, Al-Fateh University in Tripoli, Libya (S.P.L.A.J.). The characteristics of soil used for the study are shown in Table 1. The 12-24-12 compound fertilizer, peat moss, fish meal and sawdust were used in different combinations to grow transplants of *Eucalyptus camaldulensis* Dehn.

Table 1. Characteristics of soil used in the study.

| Texture<br>Name | Particle<br>Density<br>g/cm <sup>3</sup> | Bulk<br>Density<br>g/cm <sup>3</sup> | Sand<br>% | Silt<br>% | Clay<br>% | OM<br>% | CaCO <sub>3</sub><br>% | WHC<br>% | AP<br>% |
|-----------------|------------------------------------------|--------------------------------------|-----------|-----------|-----------|---------|------------------------|----------|---------|
| Sandy           | 2.63                                     | 1.52                                 | 95.94     | 2.44      | 1.62      | 0.16    | 7.2                    | 10       | 17      |

*Eucalyptus camaldulensis* Dehn. (River red gum) Fam. Myrtaceae is one of the Australia's commonest, and best evergreen gum trees. It is found in the dry and temperate main land of Australia (8). It was introduced to the Mediterranean countries in the nineteenth century (1).

The seeds were sown on February 15, 1978, in the green house in trays filled with a mixture of equal parts of sand and peat moss. In June 5, 1978 (110 days after sowing) one seedling was transplanted in a black polyethelene bag 16 cm high and 9 cm in diameter), containing the following soil mixtures:

- |                                                               |                 |
|---------------------------------------------------------------|-----------------|
| 1. 100% sand                                                  | M <sub>1</sub>  |
| 2. 75% sand + 25% peat moss                                   | M <sub>2</sub>  |
| 3. 50% sand + 50% peat moss                                   | M <sub>3</sub>  |
| 4. 75% sand + 25% sawdust                                     | M <sub>4</sub>  |
| 5. 50% sand + 50% sawdust                                     | M <sub>5</sub>  |
| 6. 50% sand + 25% peat moss + 25% sawdust                     | M <sub>6</sub>  |
| 7. 100% sand + compound fertilizer + fish meal                | M <sub>7</sub>  |
| 8. 75% sand + 25% peat moss + compound fertilizer + fish meal | M <sub>8</sub>  |
| 9. 50% sand + 50% peat moss + compound fertilizer + fish meal | M <sub>9</sub>  |
| 10. 75% sand + 25% sawdust + compound fertilizer + fish meal  | M <sub>10</sub> |
| 11. 50% sand + 50% sawdust + compound fertilizer + fish meal  | M <sub>11</sub> |

12. 50% sand + 25% peat moss + 25% sawdust + compound fertilizer + fish meal

$M_{12}$

The chemical fertilizer and fish meal were added to the last six mixtures (7 to 12) at a rate of  $1.5 \text{ kg/m}^3$  and  $1 \text{ kg/m}^3$ , respectively. Each of the twelve mixtures was mixed thoroughly before putting in the bag.

The lay out of the experiment was split plot design with three replicates and twelve treatments, with 15 transplants being used per treatment. The data recorded included:

1. Plant height which was recorded every other month from July 8, 1978 to May 8, 1979.
2. Stem diameter which was recorded every other month by a caliber, one cm above soil surface during the period from November 6, 1978 to May 9, 1979.
3. Number of leaves which was recorded every other month from August 4, 1978 to April 11, 1979.
4. Fresh and dry weight of plant tops was recorded 486 days after sowing.
5. The aeration porosity of soil for the first six mixtures ( $M_1$  to  $M_6$ ) was determined using the pressure plate apparatus (2).
6. The water holding capacity of soil for the six mixtures ( $M_1$  to  $M_6$ ) was determined using the pressure plate apparatus (7).

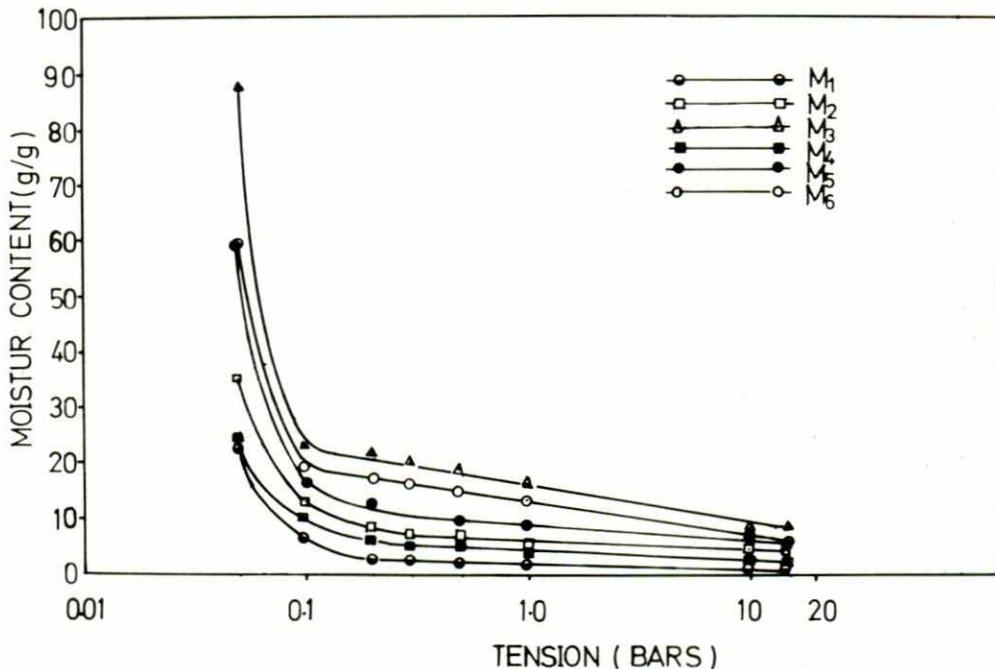


Fig. 1. Moisture tension curves for different soil mixtures.

## RESULTS AND DISCUSSION

Data presented in Figure 1 shows the values of moisture content held by the different soil mixtures at various tensions, these values are on weight basis. The data indicated that addition of peat moss and or sawdust increased the moisture holding capacity of

the sandy soils ( $M_1$ ). The available water was also varied due to soil mixing from 5.20% in  $M_1$  to 8.65, 14.11, 7.60, 9.72 and 10.78% in  $M_2$ ,  $M_3$ ,  $M_4$ ,  $M_5$  and  $M_6$  respectively. The highest value however reached in mixture  $M_3$ , the best mixture to be considered from the point of view of water holding capacity and the best condition as far as providing enough moisture for the plant growth. On the other hand the values of the aeration porosity shown on the same Figure (under tension value of 0.05 bar) supports this conclusion. The data indicated that  $M_3$  provides the best conditions for plant growth from the stand point of both moisture as well as aeration. The conclusion that can be drawn from that is the effectiveness of peat moss in improving the soil structure, it is more effective than sawdust.

The data recorded on plant height and presented in Table (2), (3), and Fig. 2 indicated that the plant height within the non fertilized mixtures was significantly higher in  $M_3$  than that recorded for  $M_1$  mixture while there was no significant difference in height between  $M_1$  and  $M_2$ . Due to the inhibiting effect of sawdust, the mixtures  $M_4$ ,  $M_5$ , and  $M_6$  showed a lower plant height than the other three mixtures ( $M_1$ ,  $M_2$  and  $M_3$ ).

The same trend was recorded for the fertilized mixtures ( $M_7$  to  $M_{12}$ ), the tallest height was reached for  $M_9$ , the shortest was recorded for plants grown in mixtures including sawdust  $M_{11}$ .

There was a significant difference in plant height between the fertilized and non fertilized mixtures, the average was 28.50 cm for the former and 15.99 cm for the latter.

The data presented in Tables (4, 5), and Fig. 3 showed that within the non fertilized mixtures, plants grown in  $M_3$  had developed the largest stem diameter. In the second order came  $M_2$  and  $M_1$  respectively, with no significant difference between the two averages.

The data showed a highly significant difference in the average stem diameter between the fertilized and non fertilized soil mixtures. The average stem diameter was 3.17 mm for the fertilized soil mixtures, and 2.17 mm for the non fertilized.

The results showed no significant difference in stem diameter within plants grown in the fertilized mixtures, however, the addition of sawdust to the mixtures had caused a significant decrease in stem diameter compared with other mixtures.

Data presented in Tables (6, 7) and Fig. 4 showed no significant difference between the average number of leaves of the first three mixtures ( $M_1$ ,  $M_2$  and  $M_3$ ). The incorporation of sawdust in mixtures  $M_4$  (13.50) and  $M_5$  (12.81) had caused a significant decrease in the number of leaves compared with the first three mixtures. The difference was not significant however, between  $M_1$  and  $M_6$ . No significant difference was recorded for the number of leaves in the first 3 mixtures of fertilized group; however, the incorporation of sawdust had caused a significant decrease in the number of leaves.

The data indicated a highly significant difference between the average number of leaves of the fertilized mixtures (19.55), and the non fertilized mixtures (16.17).

Data presented in Tables (8, 9, 10) and Fig. 5 & 6 indicated no significant difference in average weight of tops between the fertilized and non fertilized mixtures.

A heavier fresh and dry weight of tops was obtained from plants in  $M_3$  mixtures than those obtained from the other 5 mixtures. This trend was a little different for the fertilized mixtures, where  $M_7$  gave the highest value for both fresh and dry weight compared with the other 5 mixtures ( $M_8$  to  $M_{12}$ ), the difference however, was not

Table 2. Mean Height of *Eucalyptus camaldulensis* as Affected by Different Soil Mixtures and Plant Age, in cm.

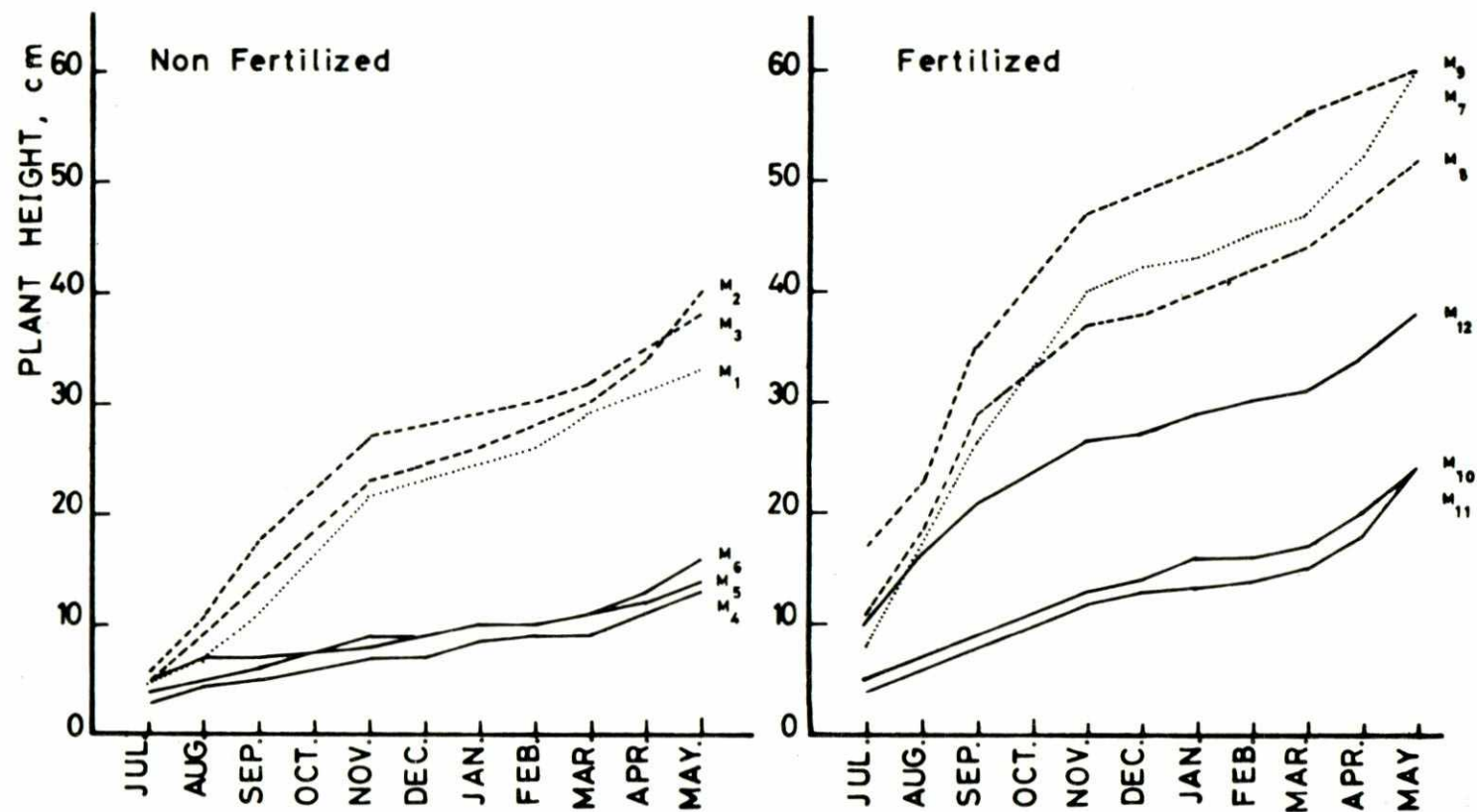
| Soil mixtures                         | Plant age |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                       | Jul.      | Aug.  | Sept. | Nov.  | Dec.  | Jan.  | Feb.  | Mar.  | Apr.  | May   | Mean  |
| Sand 100%                             | 4.47      | 7.35  | 10.98 | 21.54 | 22.89 | 24.46 | 25.78 | 28.97 | 30.89 | 33.34 | 21.07 |
| Sand 75% + Peat 25%                   | 4.87      | 9.10  | 13.68 | 22.94 | 24.54 | 25.60 | 27.87 | 30.28 | 34.22 | 38.90 | 23.20 |
| Sand 50% + Peat 50%                   | 5.84      | 11.31 | 18.36 | 27.09 | 27.77 | 28.89 | 30.47 | 32.71 | 34.68 | 38.34 | 25.55 |
| Sand 75% + Sawdust 25%                | 2.95      | 4.46  | 4.76  | 7.14  | 7.30  | 8.48  | 8.67  | 9.32  | 11.08 | 13.21 | 7.74  |
| Sand 50% + Sawdust 50%                | 4.83      | 6.65  | 6.66  | 8.42  | 8.78  | 9.76  | 9.78  | 10.57 | 11.94 | 14.25 | 9.17  |
| Sand 50% + Peat 25% + Sawdust 25%     | 3.55      | 4.77  | 5.67  | 8.67  | 9.13  | 10.06 | 10.35 | 11.11 | 13.08 | 15.92 | 9.23  |
|                                       |           |       |       |       |       |       |       |       |       |       | 15.99 |
| Sand 100% + F                         | 8.40      | 17.12 | 26.50 | 39.74 | 41.89 | 42.87 | 45.07 | 46.94 | 52.39 | 59.95 | 38.09 |
| Sand 75% + Peat 25% + F               | 11.41     | 18.53 | 28.92 | 37.17 | 38.12 | 40.26 | 41.92 | 43.95 | 48.06 | 51.65 | 36.00 |
| Sand 50% + Peat 50% + F               | 17.22     | 22.60 | 35.41 | 46.72 | 49.04 | 49.12 | 51.21 | 53.09 | 56.39 | 60.43 | 44.12 |
| Sand 75% + Sawdust 25% + F            | 4.60      | 7.37  | 8.66  | 12.68 | 13.84 | 15.70 | 15.94 | 17.03 | 19.73 | 23.67 | 13.92 |
| Sand 50% + Sawdust 50% + F            | 4.41      | 6.39  | 7.98  | 11.76 | 12.55 | 13.45 | 13.65 | 14.69 | 17.82 | 23.64 | 12.63 |
| Sand 50% + Peat 25% + Sawdust 25% + F | 10.20     | 16.03 | 21.28 | 26.50 | 27.33 | 28.91 | 29.59 | 30.97 | 33.90 | 37.75 | 26.25 |
|                                       |           |       |       |       |       |       |       |       |       |       | 28.50 |
| Mean                                  | 6.90      | 10.97 | 15.74 | 22.53 | 23.60 | 24.80 | 25.86 | 27.47 | 30.35 | 34.26 | 22.25 |

L.S.D. (0.05) for plant age = 3.72 cm

L.S.D. (0.05) for soil mixtures = 4.08 cm

L.S.D. (0.05) for plant age X soil mixtures = 12.90 cm

F = NPK fertilizer + Fish meal

Fig. 2. Effects of soil mixtures on the height of *E. Camaldulensis* plants.

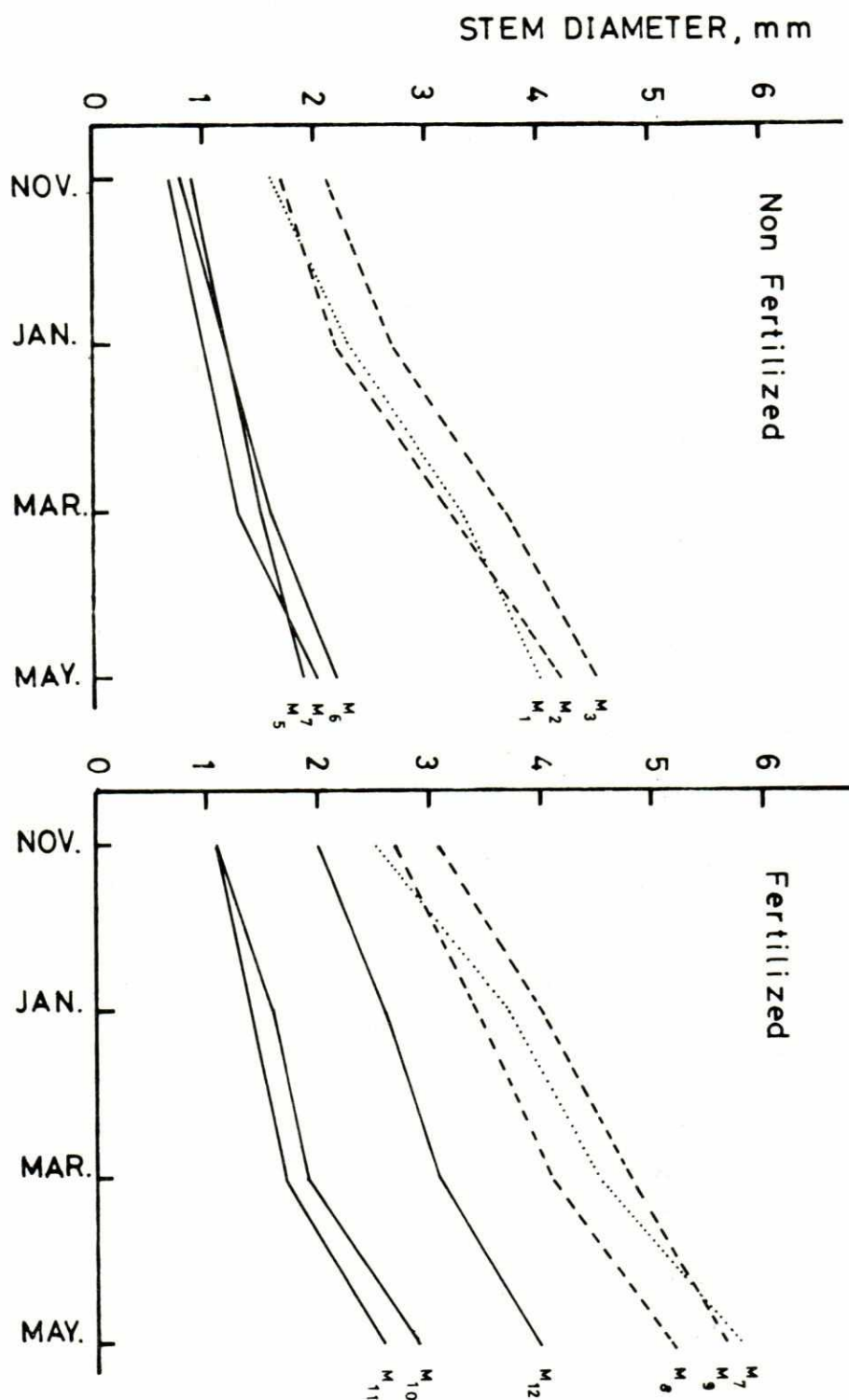


Fig. 3. Effect of different soil mixtures on the stem diameter of *E. Camadulensis* plants.

Table 3. Analysis of Variance of Plant Height of *Eucalyptus camaldulensis*, as Affected by Different Soil Mixtures and Plant Age.

| S.O.V.                   | d.f. | S.S.        | M.S.        | F                    |
|--------------------------|------|-------------|-------------|----------------------|
| Replicates               | 2    | 226.3024    | 113.1512    | 1.74 <sup>n.s.</sup> |
| Plant age                | 9    | 23,891.8237 | 2,654.6471  | 40.89**              |
| Soil mixture             | 11   | 49,812.8968 | 4,528.4452  | 69.75**              |
| Fert. vs non fert.       | 1    | 14,084.6337 | 14,084.6337 | 216.95**             |
| Within non fert.         | 5    | 9,883.2716  | 1,976.6543  | 80.45**              |
| Within fert.             | 5    | 25,844.9915 | 5,168.9983  | 79.62**              |
| Plant age x soil mixture | 99   | 6,427.1919  | 64.9211     | 3.49**               |
| Residual                 | 238  | 4,424.7915  | 18.5916     |                      |
| Total                    | 359  | 84,783.0063 |             |                      |

n.s. Non significant at the 5% level.

\* Significant at the 5% level.

\*\* Highly significant at the 5% level.

Table 4. Mean Stem Diameter of *Eucalyptus camaldulensis* as Affected by Different Soil Mixtures mm.

| Soil mixture                          | Nov./78 | Jan./79 | March./79 | May/79 | Mean |
|---------------------------------------|---------|---------|-----------|--------|------|
| Sand 100%                             | 1.62    | 2.29    | 3.31      | 4.04   | 2.28 |
| Sand 75% + Peat 25%                   | 1.66    | 2.19    | 3.21      | 4.19   | 2.81 |
| Sand 50% + Peat 50%                   | 2.06    | 2.70    | 3.69      | 4.52   | 3.24 |
| Sand 75% + Sawdust 25%                | 0.73    | 0.95    | 1.32      | 1.96   | 1.24 |
| Sand 50% + Sawdust 50%                | 0.86    | 1.16    | 1.48      | 1.87   | 1.34 |
| Sand 450% + peat 25%                  | 0.82    | 1.22    | 1.55      | 2.18   | 1.44 |
| Sawdust 25%                           |         |         |           |        | 2.17 |
| Sand 100% + F                         | 2.54    | 3.67    | 4.50      | 5.77   | 4.13 |
| Sand 75% + Peat 25% + F               | 2.72    | 3.35    | 4.10      | 5.19   | 3.88 |
| Sand 50% + Peat 50% + F               | 3.13    | 3.96    | 4.84      | 5.68   | 4.40 |
| Sand 50% + Sawdust 25% + F            | 1.09    | 1.61    | 1.94      | 2.92   | 1.89 |
| Sand 50% + Sawdust 50% + F            | 1.07    | 1.42    | 1.74      | 2.61   | 1.71 |
| Sand 50% + Peat 25% + Sawdust 25% + F | 1.99    | 2.60    | 3.05      | 3.95   | 2.90 |
|                                       |         |         |           |        | 3.17 |
| Mean                                  | 1.70    | 2.26    | 2.89      | 3.74   | 2.65 |

L.S.D. (0.05) for plant age = 0.21 mm

L.S.D. (0.05) for soil mixtures = 0.37 mm

F = NPK fertilizer + Fish meal

significant between the first three mixtures ( $M_7$ ,  $M_8$  and  $M_9$ ) and significant with the last mixtures ( $M_{10}$ ,  $M_{11}$ , and  $M_{12}$ ).

The incorporation of NPK fertilizers (12:24:12) and fish meal into the soil mixtures has found to increase significantly the fresh weight of plant tops. The average was 18.75 g for the plants grown in the fertilized mixtures and 5.63 g for those grown in the non fertilized mixtures.

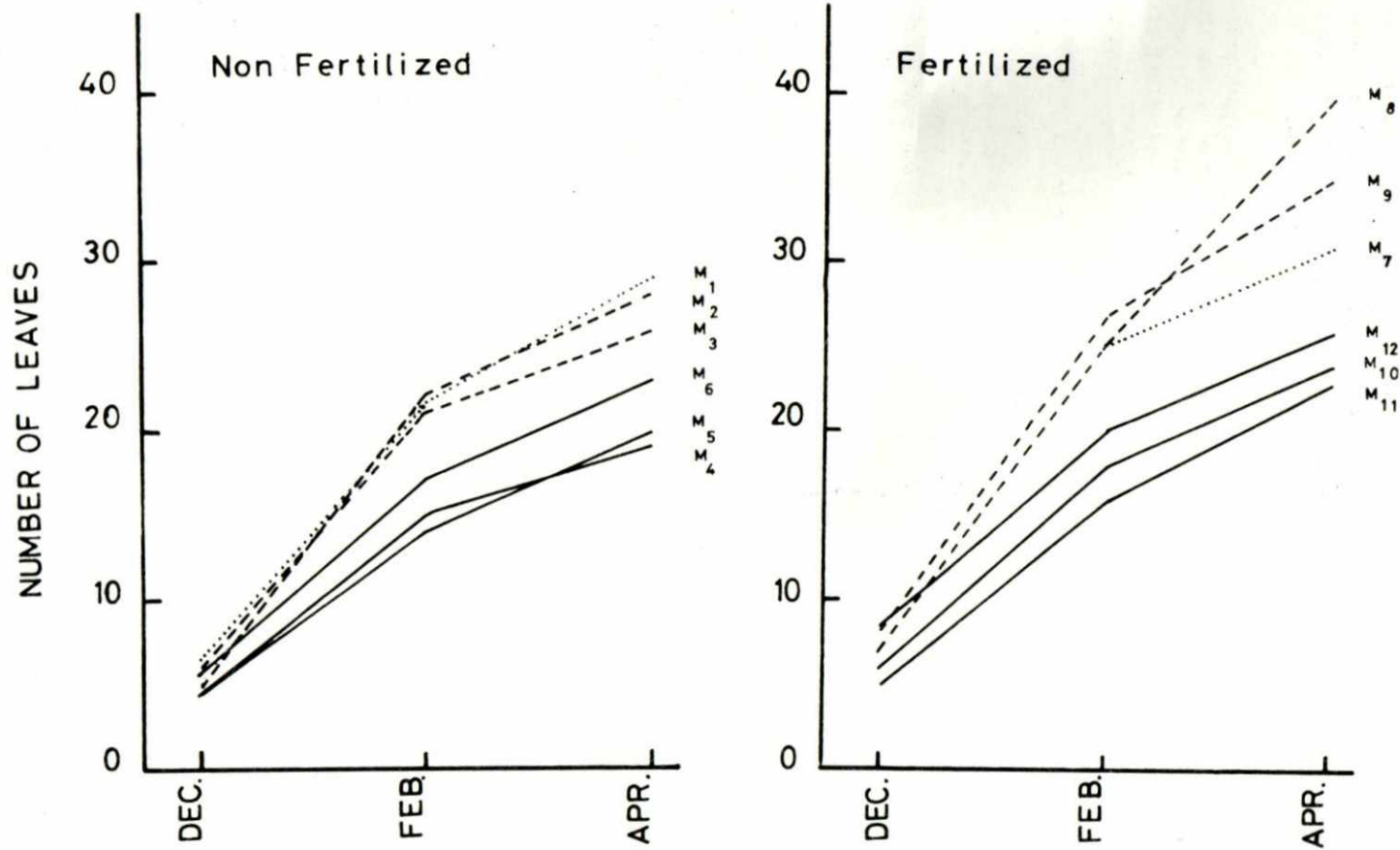
Fig. 4. Effect of soil mixtures on the number of leaves of *E. Camaldulensis* plants.

Table 5. Analysis of variance of stem diameter of *Eucalyptus camaldulensis*, as affected by different soil mixtures and plant age.

| S.O.V.                   | d.f. | S.S.     | M.S.    | F                    |
|--------------------------|------|----------|---------|----------------------|
| Replicates               | 2    | 2.6038   | 1.3019  | 6.35**               |
| Plant age                | 3    | 83.3544  | 27.7848 | 135.47**             |
| Soil mixture             | 11   | 165.3037 | 15.0276 | 73.27**              |
| Fert. vs. non fert.      | 1    | 35.7803  | 35.7803 | 174.45**             |
| Within non fert.         | 5    | 48.6562  | 9.7312  | 47.45**              |
| Within fert.             | 5    | 80.8671  | 16.1734 | 78.86**              |
| Plant age X soil mixture | 33   | 9.0023   | 0.2728  | 1.33 <sup>n.s.</sup> |
| Residual                 | 94   | 19.2827  | 0.2051  |                      |
| Total                    | 143  | 279.5469 |         |                      |

\*\* Highly significant at the 5% level.

n.s. Non significant at the 5% level.

Table 6. Mean number of leaves of *Eucalyptus camaldulensis*, as affected by different soil mixtures and plant age.

|                                          | Dec./78 | Feb./79 | Apr./79 | Mean  |
|------------------------------------------|---------|---------|---------|-------|
| Sand 100%                                | 6.47    | 21.47   | 28.83   | 18.92 |
| Sand 75% + Peat 25%                      | 5.27    | 22.30   | 28.27   | 18.61 |
| Sand 50% + Peat 50%                      | 6.27    | 21.33   | 26.17   | 17.92 |
| Sand 75% + Sawdust 25%                   | 4.53    | 15.10   | 20.87   | 13.50 |
| Sand 50% + Sawdust 50%                   | 4.00    | 14.43   | 20.00   | 12.81 |
| Sand 50% + Peat 25% +<br>Sawdust 25%     | 5.20    | 17.40   | 23.17   | 15.26 |
|                                          |         |         |         | 16.17 |
| Sand 100% + F                            | 7.40    | 24.60   | 30.93   | 20.98 |
| Sand 75% + Peat 25% + F                  | 7.07    | 25.07   | 40.30   | 24.14 |
| Sand 50% + Peat 50% + F                  | 7.93    | 26.90   | 35.40   | 23.41 |
| Sand 75% + Sawdust 25% + F               | 5.87    | 18.30   | 24.07   | 16.08 |
| Sand 50% + Sawdust 50% + F               | 4.67    | 15.67   | 22.57   | 18.39 |
| Sand 50% + Peat 25% +<br>Sawdust 25% + F | 8.47    | 20.27   | 26.43   | 18.39 |
|                                          |         |         |         | 19.55 |
| Mean                                     | 6.09    | 20.24   | 27.25   | 17.86 |

L.S.D. (0.05) for plant age = 2.20

L.S.D. (0.05) for soil mixtures = 4.39

L.S.D. (0.05) for plant age X soil mixtures = 7.60

F = NPK fertilizer + Fish meal

The dry weight of plant tops had also significantly increased with NPK fertilizer and fish meal application. The average dry weight of plant tops was 7.96 g for the fertilized mixtures and 2.63 g for the non fertilized.

The incorporation of sawdust had caused a significant decrease in the dry weight of tops.

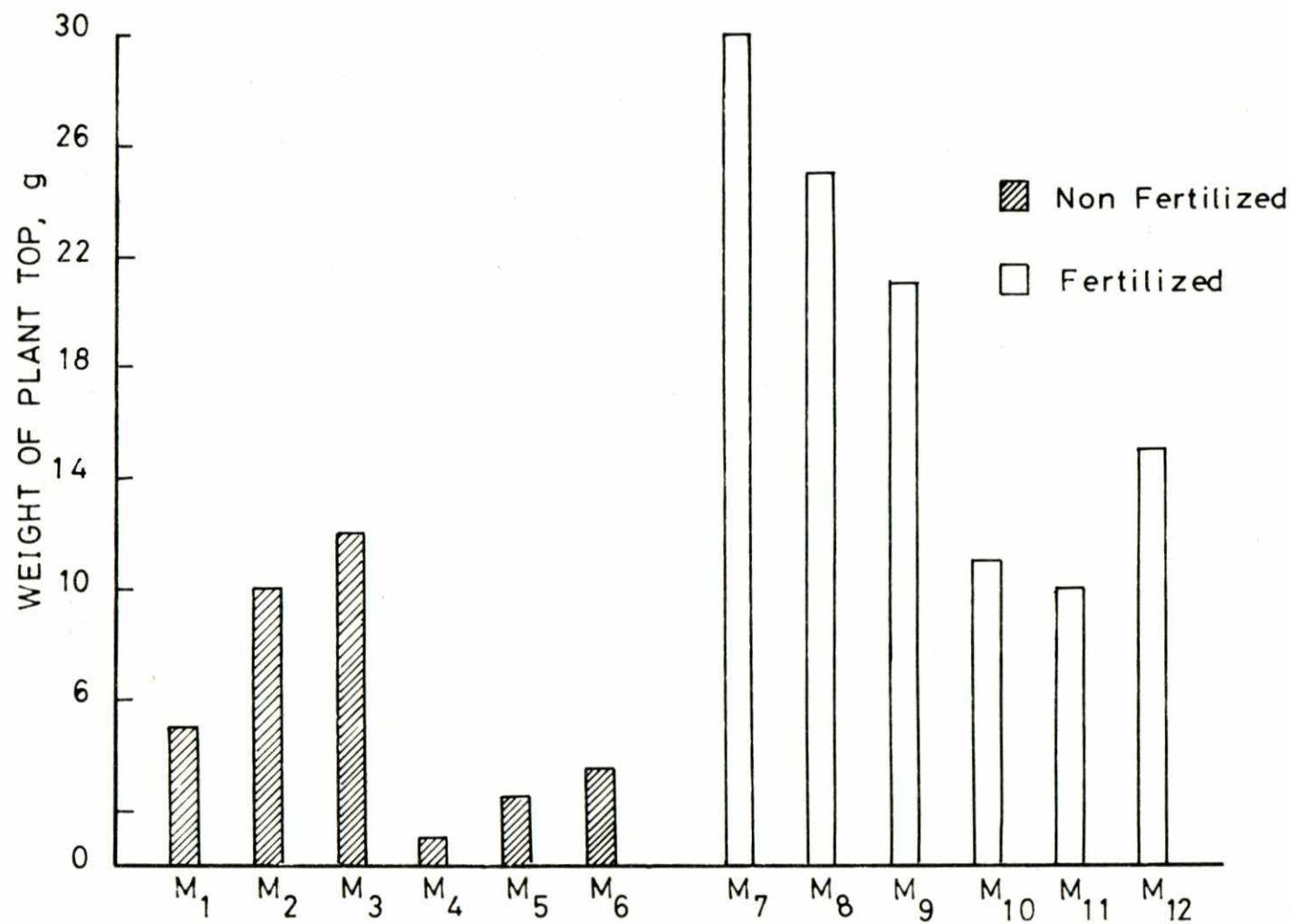


Fig. 5. Effect of different soil mixtures on the fresh weight of *E. Camaldulensis*.

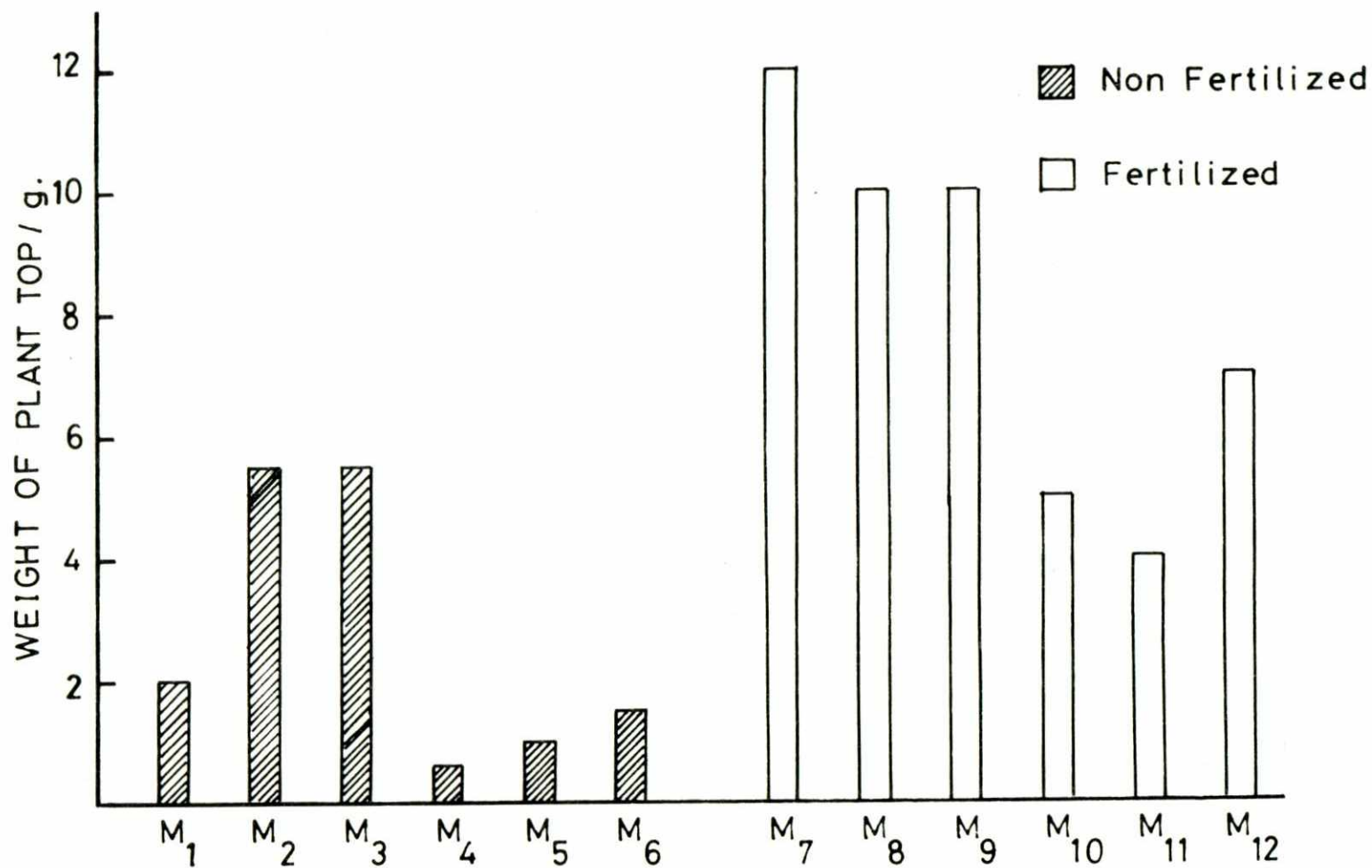


Fig. 6. Effect of different soil mixtures on the dry weight of *E. Camaldulensis*.

Table 7. Analysis of variance of the number of leaves of *Eucalyptus camaldulensis*, as affected by different soil mixtures and plant age.

| S.O.V.                   | d.f. | S.S.        | M.S.       | F                    |
|--------------------------|------|-------------|------------|----------------------|
| Replicates               | 2    | 38.9446     | 19.4723    | 0.90 <sup>n.s.</sup> |
| Plant age                | 2    | 8,360.8669  | 4,180.4335 | 192.79**             |
| Soil mixture             | 11   | 1,342.2566  | 122.0233   | 5.63**               |
| Fert. vs. non fert.      | 1    | 308.3912    | 308.3912   | 14.22*               |
| Within non fert.         | 5    | 322.6659    | 64.5332    | 2.98*                |
| Within fert.             | 5    | 711.1995    | 142.2399   | 6.56**               |
| Plant age X soil mixture | 22   | 477.0553    | 21.6843    | 2.17*                |
| Residual                 | 70   | 700.4671    | 10.0067    |                      |
| Total                    | 107  | 10,919.5905 |            |                      |

n.s. Non significant at the 5% level

\* Significant at the 5% level

\*\* Highly significant at the 5% level

Table 8. Means of Fresh and Dry Weights of Tops of *Eucalyptus camaldulensis* Transplants as Affected by Different Soil Mixtures.

| Soil mixture                          | Mean fresh weight, g | Mean dry weight, g |
|---------------------------------------|----------------------|--------------------|
| Sand 100%                             | 4.73                 | 2.19               |
| Sand 75% + Peat 25%                   | 9.61                 | 4.94               |
| Sand 50% + Peat 50%                   | 12.17                | 5.41               |
| Sand 75% + Sawdust 25%                | 1.30                 | 0.59               |
| Sand 50% + Sawdust 50%                | 2.53                 | 1.12               |
| Sand 50% + Peat 25% + Sawdust 25%     | 3.46                 | 1.50               |
|                                       | 5.63                 | 2.63               |
| Sand 100% + F                         | 29.83                | 12.01              |
| Sand 75% + Peat 25% + F               | 25.07                | 10.29              |
| Sand 50% + Peat 50% + F               | 20.80                | 10.26              |
| Sand 75% + Sawdust 25% + F            | 11.39                | 4.74               |
| Sand 50% + Sawdust 50% + F            | 9.97                 | 3.66               |
| Sand 50% + Peat 25% + Sawdust 25% + F | 15.43                | 6.81               |
|                                       | 18.75                | 7.96               |
| Mean                                  | 12.19                | 5.29               |
| L.S.D. (0.05) for soil mixtures       | 10.48 g              | 4.02 g             |

Table 9. Analysis of Variance of Fresh Weight of Plant Top of *Eucalyptus camaldulensis*, as Affected by Different Soil Mixtures and Plant Age.

| S.O.V.             | d.f. | S.S.       | M.S.       | F                    |
|--------------------|------|------------|------------|----------------------|
| Replicates         | 2    | 449.8329   | 224.9165   | 5.88*                |
| Soil mixture       | 11   | 2,752.5343 | 250.2304   | 6.54**               |
| Fert. vs non fert. | 1    | 1,548.8161 | 1,548.8161 | 40.47**              |
| Within non fert.   | 5    | 926.1194   | 185.2239   | 4.84**               |
| Within fert.       | 5    | 277.5989   | 55.5198    | 1.45 <sup>n.s.</sup> |
| Residual           | 22   | 841.8660   | 38.2666    |                      |
| Total              | 35   | 4,044.2332 |            |                      |

\* Significant at the 5% level

\*\* Highly significant at the 5% level

n.s. Non significant at the 5% level

Table 10. Analysis of Variance of Dry Weight of Plant Top of *Eucalyptus camaldulensis*, as Affected by Different Soil Mixtures

| S.O.V.              | d.f. | S.S.     | M.S.     | F                    |
|---------------------|------|----------|----------|----------------------|
| Replicates          | 2    | 60.3833  | 30.1917  | 5.36*                |
| Soil mixture        | 11   | 491.0960 | 44.6451  | 7.93**               |
| Fert. vs. non fert. | 1    | 256.1601 | 256.1601 | 45.51**              |
| Within non fert.    | 5    | 171.9893 | 34.3979  | 6.11**               |
| Within fert.        | 5    | 62.9466  | 12.5893  | 2.24 <sup>n.s.</sup> |
| Residual            | 22   | 123.8216 | 5.6283   |                      |
| Total               | 35   | 675.3009 |          |                      |

\* Significant at the 5% level

\*\* Highly significant at the 5% level

n.s. Non significant at the 5% level

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## تأثير خلط التربة بالبقايا العضوية على بعض الخواص الفيزيائية للتربة ونمو النبات

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### الملخص

تمت دراسة تأثير خلط التربة بالبقايا العضوية على بعض الخواص الفيزيائية للتربة ونمو النبات في مشتل محطات تجارب جامعة الفاتح في طرابلس - ليبيا خلال عامي ١٩٧٨ - ١٩٧٩ م.

لقد تم التركيز على خاصيتين من الخواص الفيزيائية وهما قدرة التربة على الإحتفاظ بالماء والمسامية الهوائية وكلاهما قد تأثر بعملية الخلط. وقد دلت النتائج على أن نسبة الخلط ٥٠٪ رمل + ٥٠٪ بيت موس مخلوط (م) قد أعطى أحسن النتائج حيث زادت قدرة التربة على إستيعاب الماء من ١٠٪ تقريباً للمخلوط م (١٠٠٪ رمل) إلى ٣٥٪ في المخلوط م. كما انخفضت المسامية الهوائية من ١٧٪ في المخلوط م إلى حوالي ٩٪ في المخلوط م. كما تشير النتائج إلى أن المخلوط م هو الأفضل والأنسب لنمو أشجار اليوكالبتس.

وللحصول على نموات أقوى وأحسن بفضل الخلطة م والتي تحتوي على ٥٠٪ رمل + ٥٠٪ بيت موس + سماد مركب + بقايا أسمك. وفي حالة استعمال نشارة الخشب كبديل للبيت موس المستورد يجب معاملتها باليوربا قبل خلطها في التربة.