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Research Article

Effect of soil types on leave area development in *Corchorus Olitorius seedlings*

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Abstract

Leaf area development study was carried out on *Corchorus olitorius* using two soil types .The types of soils used are humus and sandy soils. The mean leaf area of 60.77cm was recorded for those planted in humus while 18.94cm was observed in those planted in sandy soil .In comparing the above results, the study therefore showed that Corchorus olitorius is best grown vegetative in humus.

Keywords: Vegetative growth, Corchorus olitorius, Seedlings

INTRODUCTION

Corchorus olitorius belongs to the family Tiliaceae. It is a half shrubby, slender tall annual plant with yellow flowers. It is grown throughout the Middle East and in part of Africa and India as a pot herb. Much of the jute crop is grown in deltaic areas at low altitude with high temperatures of 75to 95of, a high humidity of over 400inches per annum, so distributed that beyond plant have enough moisture with a fertile alluvial soils .A sufficient supply of clean retting water is also required.

Harvesting usually begins 100-130 days after the planting when about 50% of the plants are in pod. *Corchorus olitorius* is economically important in Nigeria. The leaves are edible vegetables. It is chiefly important in India as the source of the best fibre “tossa” jute. Corchorus olitorius is among the indigenous leafy vegetable species which spread across the estimated cultivable land area of 71.2 million hectares and they provide food, income, employment and herbal remedies to the population

Indigenous leafy vegetables are said to be affected by pests, diseases, anti- nutritional factors which militate against the realization of the potentials of these indigenous leafy vegetables and a major production limiting factor is the attack by leaf defoliator named Acrae eponia.

However, Corchorus olitorius is among the few indigenous leafy vegetables that is receiving research attention in Nigeria .The National Horticultural Research Institute (NIHORT) Ibadan has resulted in the production of improved and pure *Corchorus tridens* varieties of the morphotypes known in Nigeria. On the few varieties developed, micro propagation is desirable for further invitro selection to obtain lines with desirable morphological traits and improve resistance to insect pest attack. As a result of many close and wild relative species *of Corchorus like, C. tricularis, C. aetuans, C. asperifolins, and C.fascicularis*. Inter-specific crossing appears to be a possible way of developing high yielding varieties with acceptable nutritional qualities and long shelf life.

The plant can grow well in water-logged environment, but it grows best in daily watering (Egberi and Osagie, 2009). The production of adventitious roots on the original roots on the submerged portion of the stem or both enables it to well in water-logged areas. Lines of evidence indicated that adventitious roots compensate physiologically for loss by decay of portions of the original root system following water-logging .First, flood tolerance and production of adventitious roots are correlated (Clemens, 1978).Secondly ,flooding induces increase in water absorption by roots(Hook and Scholtens,1978). Thirdly, flooding induces adventitious root oxidation in the rhizosphere and transform some soil borne toxins to less harmful compounds (Hook, 1970; Hook and Brown, 1973). Flooding- induced adventitious root increase the supply of root synthesized gibberellins and cytokinins to the leaves (Reid and Bradford, 1984).

Humus soil

Humus is defined as a biologically stable, dark, amorphous material formed by the microbial decomposition of plants and animals residues. The formation of humus begins when the residues from plants and animals come in contact with microbial lives in the soil .Much of the carbon compounds contained in those residues are proteins, carbohydrates and energy from the various bacteria, fungi, and actinomycetes are involved in the decay process.

Aerobic micro-organisms are the most adept at decomposing organic matters. The need an environment where there is an adequate amount of free oxygen to live and to be active. The degree to which free oxygen exists in soils plays a major role in regulating the favourable or unfavourable conditions under which humus is formed. The same is true for the amount of moisture, soil temperature and carbon to nitrogen ratio of the residues being decomposed. As the temperature of a soil increases, there is a corresponding increase in microbial activities. Soils that exist in warmer regions tend to have lower average levels of humus than soils in colder areas. In the soil, organic matter is assimilated by micro-organisms utilizing the nutrients and energy of their own metabolisms; their activities convert much of the organically bound nutrients back into a mineral form, which is useable by plants and other micro-organisms .The indigestible portion of the residues accumulate as humus.

However, humus is not completely immune to decomposition. Micro-organisms will eventually recycle all the elements in humus back to where they initially came from, even if it takes a millennium to do it. Humic acid(Natural Organic Matter (NOM)) is one of the major components of humus .They are dark brown, they contribute to soil chemical and physical quality ,they are also precursors of some fossil fuels. They can also be found in peat, coal, many upland streams and ocean water. Humic substances make up a large portion of the dark matter in humus and are complex colloidal supramolecular mixtures that have been separated into components.

Humic substances have been recently designated as humic acid, fulvic acid or humin. Their functions are defined strictly on their solubility in either acid or alkaline describing the materials by operation only, thus imparting no chemical information about the extracted materials. The term humic substances are used in a general sense to distinguish the natural occurring material from the chemical extractions called humic acid and fulvic acid which are defined operationally by their solubility in acid or alkaline solutions.

It is important to note however that there are no sharp divisions between humic acid, fulvic acid and humus. They are all part of an extremely heterogeneous super molecular system. The differences between the subdivisions are due to variations in chemical composition, acidity, degree of hydrophobicity and self-association of molecules.

Merit of humus to the soil

(a) The mineralization process that converts organic matters to relatively stable substance (humus) feeds the soil population of micro-organisms and other creatures , thus maintaining high and healthy levels of soil life.

(b) Humus are further sources of nutrients to micro-organisms, the former providing a readily available supply while the later acts as amore long term storage reservoir.

(c) Humification of dead plants and animals material causes complex organic compounds to break down into simpler forms which are then made available to growing plants.

(d) Humus is a colloidal substance, it increases the soils cation exchange capacity, and hence it has the ability to store nutrients on clay particles. These nutrient cat ions are accessible to plants, and also are equally held in the soil safe from leaching by rain or irrigation.

(e) Humus can hold equivalent of 80-90% of its weight in moisture, this therefore increases the soils capacity to withstand drought conditions.

(f) The biochemical structure of humus enables it to buffer excessive acid or alkaline soil conditions.

(g) The dark colour of humus helps to warm up cold soils.

(h) During the humification process, microbes secrete sticky gums. These gums contribute to the crumb structure of the soil by holding particles together, thereby allowing greater aeration of the soil.

Sandy soil

Sandy soil has about 85% more of sandy particles. It is coarse and also referred to as light soil due to ease of cultivation. The particles are large and range from 0.02mm.Sandy soil has large pore spaces between the particles which make air and water move freely and fast. It has low water retention capacity and it is easily carried away by erosion. The particles do not stick together when rolled between hands even when moist or wet.

Features of sandy soil

(a) Sandy soils have low water retentive capacity.
(b) They are easily carried away by erosion.

Naturally, environmental conditions affect the magnitude of growth of plant at all stages of their life cycle. Under suitable conditions, all living organisms at various stages in their life history are capable of changes in size, form and number. These are distinguishing factors between the living and the non-living components.

Growth is an irreversible increase in size i.e. dry weight or the addition of new materials (Evans, 1972). Growth results from the production of food during photosynthesis and its rate therefore depend largely on the leaves. The growth of a plant depends simultaneously upon the efficiency of its leaves as primary producers of new materials (Hunt, 1978). Plant growth is normally affected by many environmental stresses such as temperature, water and light. Some grow under suitable conditions of temperature and moisture when the soil is either sandy or humus.

These plants have their mechanical and conducting tissues reaching their full development. Other adaptations include the presence of long tap root and the development of fleshy leaves and stems .Reduction in the rate of cell enlargement and hence the expansion of leaf area will progressively increase as well as cell tugor falls. This will cause a gradual decrease in the growth rate. This paper reports leaf area development in *Corchorus olitorius* to two soil types.

MATERIALS AND METHOD

The seedlings of *Corchorus olitorius* were transplanted into horticultural pots measuring 12cm by 8cm. Five (5) ports containing humus and another five (5) ports contained sandy soil.
The plants were subjected to the same environmental conditions (in a green house) for a period of two months.

Leaf area Determination

At the end of the experiment, the leaf area was determined by tracing the outlines of the leaves on graph papers graduated in centimetres. While a leaf is being traced, the remaining leaves were in closed Petri-dishes. This was to reduce the rate of desiccation that would affect leaf area measurement.

RESULTS AND DISCUSSION

Table 1. Effect of two soil types on leaf area development in *Corchorus Olitorius* seedlings

Treatments	Leaf Area (cm^2)
Humus soil	2167.80 +60.77
Sandy soil	682.00 + 18.94

The table shows that those plants cultivated with humus have average mean area of 60.77cm while those on sandy soil have 18.94cm as their average mean area. The observations revealed that the area in humus is higher than those in sandy soil this

Therefore substantiate the fact that the colloidal property of humus increases the soils cation exchange capacity and so it has the ability to store nutrients. Also during humification process, microbes secrete sticky gums that contribute the crumb structure of the soil thereby allowing greater aeration of the soil.

The large difference observed in the results is due to the fact that sandy soil has low retentive capacity and soil fertility is very minimal.

CONCLUSION

With reference to the above results, it therefore recommended that for leaf maximization in *Corchorus olitorius*, it is best grown vegetatively in humus soil.

References

Clemens J , Kirt JM, Mills PD(1978).The resistance to water- logging of three *Eucalyptus spp. Oecologia.* 34: 125-131.
Egberi FO, Osagie G(2009). The effect of Watering Regimes on Biomass Development in *Corchorus olitorius*. *Mosogar J. Sci. Edu.* 1:50-59.

Evans G(1972). Quantitative analysis of plant growth .Blackwell scientific (Publishing).Oxford, London. Pp. 622.
Hook DD, brown CL(1973). Root adaptations and relative flooding tolerance of five hard wood species. *Forest Science*. 19:225-229.
Hook DD, Brown CL, Kormanik PP(1970). Lenticels and water root development of swamp *Tupelo* under various flooding conditions. *Botanical Gazette*. 22: 78-89.
Hook DD, Scholtens JR(1978). Adaptation and flood tolerance of tree species. In: HOOK D.D and CROWFORD, M. M. (Eds) .Plant life in anaerobic environments. Annual Report of Arboriculture Science.(Published). Pp. 229-331.
Hunt R(1978).Plant growth analysis. Edward Arnold Publishing Limited, London. Pp. 61.
Reid DM, Bradford KJ(1984). Effect of flooding on hormone relation. In: Kozlowski, T. T. (Ed). Flooding and plant growth. Academic Press. Orlando. Pp. 195-219**.**