THE EFFECT OF MARINE GREEN ALGAE, ULVA SP. AS COMPOST MANURE ON THE YIELD OF MAIZE (VAR. COAST COMPOSITE)

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INTRODUCTION

Due to the heterogenous nature of the Kenyan coastline Kenya has a very rich algal flora which consists of about 300 species of algae (Moorjani, 1977). But it is unfortunate that this rich flora has not been made much use of. The value of seaweeds in fertilizing the soil was discovered early in the history of agriculture in coastal Asia and coasts and islands of northwestern Europe (Dawson, 1966).

In the Kenyan market there are different types of imported marine algae products some of which use the following trade names: Chase SM3 for crops and pasture, Chase Blend 14C for cattle and chase Blend 14P for poultry. Most of the Kenyan small scale farmers are not in a position to use large sums of money buying chemical fertilizers or the above cited seaweed has been effectively used directly as compost manure by farmers (Sepheson, 1957) it is important that the possibility of using seaweed as compost manure under the prevailing local conditions is investigated.

The present paper, therefore, investigates the effect that *Ulva* would have on the yield of maize (var. coast composite) under the conditions prevailing around Mombasa area. *Ulva* is genus of green algae (Chlorophyta) that is composed of species that are membraneous, entire or perforated sheets, strap - like or small rounded lobes forming roseltes. They flourish in the intertidal zone. This genus is abundant around Mombasa and collects in large quantities offshore, thus making it easy to collect in mass.

METHODS

A piece of land was prepared and the soil thoroughly mixed before dividing it into 9 plots of 4m by 4m by 4m each. Using randomised block design the plots were divided into 3 blocks each consisting of three plots. *Ulva* was collected from the shore around Mkomani area and thoroughly washed with fresh water to remove most of the salts and sand. The species of *Ulva* collected were *U. reticulata, U. pertusa* and *U. fasciata* with *U. fasciata* forming the bulk of the collection. This *Ulva* was burried in the soil in one plot randomly picked from each of the 3 blocks. It was applied at the rate of 1 kg. of fresh *Ulva* per hole where the seeds would eventually be sown. It was then left to decompose for two months before the seeds were sown.

At the time of sowing double superphosphate (P202) was applied in one plot chosen randomly from each of the three blocks. This was done at a rate of 100 kg/ha (approx.2.9g/plant). The remaining plots had seeds sown without any prior treatments. The sowing was done two weeks after the onset of the long rains. The plants that had chemical fertilizer had a top dressing calcium ammonium nitrate applied at a rate of 150 kg/ha (approx. 4.3g per plant); when the plants were 45 cm high. Weeding was done twice, the first one 4 weeks after germination and the second 5 weeks after the first weeding when the yield was ready, it was harvested and the dry weight per plot noted.

RESULTS

Table I Summarizes the observations made thoughout the trial whereas tables 2 and 3 show the statistical analysis of the results.

Table I: Effect of different treatments on germination, insect damage, weed cover and yield of coast composite.

	Treatments		
	Double Superphosphate	Ulva Manure	Control
% Germination	90	93	90
% Insect damage	30	29	36
% Weed cover	67	33	75
Yield (Kg)	3.55 ± 0.41	3.8 ± 0.53	1.9 ± 0.66

Table 2:

F-Values resulting from comparisons of different aspects of the three treatments.

Table 2:

Aspects	Calculated F. Value	Tabulated F-Value 5% level
Germination count	0.75	
(block means)		
(block means)	0.25	
Insect damage	1.00	
(block means)	0.35	6.94
Weed cover	2.8	
(block means)	0.7	
Harvest weight	9.49*	
(block means)	0.6	

Table 3
t-values resulting from comparison of the yield of the three treatment.

Treatment	Calculated t value	Tabulate t value - 5% level
Ulva manure Vs.		
Chemical fertilizers	0.65	
Chemical fertilizers		
Vs. Control	3.7*	2.776
Ulva manure		
Vs. Control	3.91*	

The plants from the *Ulva* and chemical fertilizer treated plots showed healthy growth throughout the growing period and their yield also looked much healthier with very well formed grains as compared to the control.

Analysis of covariance of the three treatments show that germination count, insect damage count and weed cover estimations do not have any significant differences in their treatment means. But on the other hand the treatment means of their yields show significant difference between the yield from *Ulva* treated and control and that the chemical fertilizer treated yield also significantly differs from that of control. But on the other hand, there is no significant difference between *Ulva* treated and chemical fertilizer treated yields. The F values for the block means of all the aspects considered show no significant differences.

DISCUSSION

Quite a variety of marine algae are able to absorb a wide range of mineral elements dissolved in sea water and accumulate them into higher levels (Mshigeni, 1981). Duddington (1966) reported that seaweed manure contains about as much nitrogen as an equal weight of formyard manure, and about twice as much potash, thus making it suitable for soils lacking in potash. Trials with tomato plants have also showed that seaweed not only provides trace elements, but also makes it possible for the plants to take up more of these elements from the soil, (Yamaha Fishery Journal No. 1 - 15).

Ulva species are suitable for fertilizing soils because of their high nitrogen content, since they grow in waters that are rich in nutrients (Levring et. al., 1969) Imbamba (1972) screened some Kenyan algae for nitrogen, phosphorus and potassium and among the species screened *Ulva* species were found to be having very high nitrogen contents. He also made an observation that the algae that ranked high in nitrogen also had high levels of phosphorus.

Apart from adding the necessary elements to the soils, seaweed also improves the water holding capacity of soils. The organic matter decay slowly in the soil and form humus which enriches the soil (Dawson, 1966). As the soils water holding capacity and crumb structure improves it leads to better aeration and capillary action and these stimulate the root systems of plants to further growth and hence stimulate the soil bacteria to greater activity (Stephenson, 1957).

All the above information gives possible reasons why the yield from the *Ulva* treated plants was not any significantly different from the chemical fertilizer treated one. Lack of significant difference in the block means and the other aspects considered show the difference in the yields was due to treatments.

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