"SLASH" for Flower and Vegetable Production in the Informal Sector in South Africa

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KEYWORDS: Biosolids, capacity building, fly ash, impoverished sector, lime

ABSTRACT

In South Africa, many rural communities are characterized by unemployment and a poor resource base. The SLASH programme aims to convert a waste problem into a potential solution, enabling such people to produce vegetables and flowers. This trial, conducted using simple raised beds, using discarded tyres, compared the production of spinach (a popular vegetable), and asters (a potential flower crop), using a range of SLASH treatments. A mixture of 5% SLASH and 95% soil, gave the best results with spinach. The treatment with 10% SLASH gave similar results, while the treatment receiving 30% SLASH - although yielding more than the untreated soil - exhibited deficiency symptoms. All SLASH treatments, exhibited improved vigour of asters over the control but all showed deficiency symptoms. These were most severe in the 30% treatment. The potential use of SLASH in rural communities exists. Refinement of the technology is, however, required.

INTRODUCTION

South Africa is characterized by a poor agricultural resource base. The current population of 40 million continues to grow. Despite one of the most vibrant economies in Africa the country is characterized by impoverished rural communities, increased urbanization and a high unemployment rate. Many of our people therefore need to produce their own food to survive or to develop home industries to facilitate participation in the informal sector of the economy.

The results, reported by Reynolds, Kruger and Rethman[1] and Rethman, Reynolds and Kruger[2] on the potential use of waste products such as sewage sludge, quicklime and fly ash to produce a soil ameliorant such as SLASH, presents an opportunity to address the situation. The potential of SLASH to improve soil pH and - in cases of low fertility - to improve crop yields, combined with the concepts of "Peace Gardens" (W van der Walt, South African National Seed Organization, Personal Communication) and "Raised Bed Culture" (R L Dalrymple, Noble Foundation, Ardmore, OK., USA, Personal Communication) resulted in a program to assess the potential of these concepts. This investigation utilising SLASH amended soils to produce flowers and vegetables was

carried out to pilot the concept. The results presented are from the first of such trials - a relatively simple pilot trial using no other inputs and evaluating a very wide range of applications - to provide a basis for developing different treatments and identifying critical factors in such a production process.

METHODOLOGY

A randomized block design with four treatments and four replications was used to determine the optimum range of "SLASH" application for spinach (*Beta vulgaris*) and asters (*Aster sp.*). The soil was characterized by 20% fine fraction (silt and clay) and 80% sand fraction. The initial chemical analysis revealed a pH of 7.4, a P content (Bray I) of 5 ppm and Ca, Mg and K contents (Ammonium Acetate Extraction) of 270, 125 and 20 ppm respectively. This relatively infertile soil was used together with SLASH in the following proportions:

Treatment 1	:	100% soil
Treatment 2	:	95% soil and 5% SLASH
Treatment 3	:	90% soil and 10% SLASH
Treatment 4	:	70% soil and 30% SLASH

The SLASH used consisted of 27% sewage sludge, 64% fly ash and 9% lime on a dry matter basis. After mixing, the soil substrates were placed in "raised beds", consisting of old motor tyres, of 35 cm in diameter and 40 cm depth. Seedlings of spinach and asters - chosen because of their popularity as vegetable and potential marketable flowers respectively - were planted in mid-summer. During the growth period of 70 days beds were watered regularly to ensure that moisture was not limiting. At the end of February 1999 all plants were harvested and incidence of deficiencies; number of leaves (spinach); number of flowers (asters); height of plants (spinach and asters); height of 1st flowering branch (asters); number of flowering branches (asters); total length of branches (asters); dry mass of above ground growth (spinach and asters), were recorded.

RESULTS AND DISCUSSION

***Spinach*:** The influence of SLASH addition on the growth of the plant is summarized in **Table 1**. From this data it is evident that SLASH, when applied to infertile soils, has a beneficial effect on the growth and production of spinach.

Table 1: Influence of SLASH on height, number of leaves and mass of spinach plants

% SLASH in medium	Plant height (cm)	No of leaves/plant	Plant mass (g)
0	20	7	18
5	40	19	70
10	38	21	59
30	25	20	39

Indications are that the use of very high levels of application, above 10% would, have a depressing effect. At this stage it would appear logical to recommend repeated applications (at, for example, the 5% level) rather than a single heavy application. The performance of subsequent crops on these amended soils should hopefully provide greater clarity on this aspect.

Asters: The response to SLASH applications (**Table 2**) was similar to that of spinach, although it appeared to be more sensitive to levels exceeding 5%. Most of the parameters assessed at 10% SLASH were poorer than the control, while the 30% treatment was the poorest in virtually all aspects. This was compounded by the fact that a leaf edge scorch (attributed in retrospect to a potassium deficiency) was twice as prevalent in the 30% treatment.

Table 2: Response of plant growth and flowering characteristics of asters to different applications of SLASH

% SLASH in medium	Plant height (cm)	Plant Mass (g)	Number of flowers	Height of 1st flowering branch (cm)	Length of flowering branches (cm)	Total length of all branches (cm)
0	27	29	8	1	11	119
5	57	35	9	8	8	213
10	42	27	5	11	7	85
30	30	25	6	9	6	70

With respect to the influence of SLASH on the growing medium it was of particular interest that apart from the effect on chemical analysis (SLASH levels increased pH by 0.70, 1.05 and 2.37 units respectively; P content of SLASH treatments averaged 61 ppm compared with 5 ppm of control; Ca content of SLASH treatments increased from 270 to 1845 to 2960 to 4385 ppm respectively and Mg content increased from 125 to 145 to 160 to 175 ppm with each increase in SLASH application), SLASH also had a marked effect on texture. The fine fraction was increased from 20% to 23%, 30% and 40% respectively with increasing levels of SLASH application.

CONCLUSIONS

The addition of SLASH as a soil ameliorant in raised bed culture, to produce food or marketable flowers, holds definite potential. Considerable refinement of the principles, with respect to different soils, different crops and different levels of amelioration, are still, however, required.

In concluding it is evident from these results that optimizing levels of SLASH should take cognisance of both the original soil condition and crop requirements. Apart from species differences, the end use (flowers or vegetables) also needs to be taken into account.

REFERENCES

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