PLANTING METHOD AND SEED DENSITY AFFECTED VEGETABLE YIELD AND NUTRIENT COMPOSITION OF *Solanum macrocarpon* AND *Solanum nigrum*

BY

IDOWU M. K.[1], OYEDELE, D. J[1]. AND ADEKUNLE, O. K[2].

[1]GENDER: FEMALE
INSTITUTION ON AFFLIATION: OBAFEMI AWOLOWO UNIVERSITY, NIGERIA
E-MAIL: marykemii@yahoo.com

[1]DEPARTMENT OF SOIL SCIENCE AND LAND RESOURCES MANAGEMENT, FACULTY OF AGRICULTURE, OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, OSUN STATE, NIGERIA; [2]DEPARTMENT OF CROP PRODUCTION AND PROTECTION, FACULTY OF AGRICULTURE, OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, OSUN STATE, NIGERIA
PHONE NO.: +234 8038272331

INTRODUCTION

About 35 % of Nigerians that are living in absolute poverty (World Bank, 2009) are mostly rural women who resort to gathering of indigenous vegetables for food and nutrient supplies because of their inability to purchase highly nutritious food items such as egg, meat and milk. *Solanum macrocarpon* and *Solanum nigrum* are important indigenous crops of southwest Nigeria, believed to be nutritive and serve as cheap sources of minerals and vitamins. However, there are limited information on planting method and seed density for achieving optimal yield and good quality for the vegetables.

Objective

To investigate the effect of planting method and seed density on biomass yield and nutrient composition of *Solanum macrocarpon* and *Solanum nigrum*, with the view to elucidate the best methods for producing quality vegetables.

MATERIALS AND METHODS

Description of the study area

The study was carried out at the Teaching and Research Farm of the Obafemi Awolowo University, Ile-Ife, Nigeria on Ultisol. Ile-Ife lies between latitudes 7 ˚31' and 7 ˚33 'N and longitudes 4 ˚33 ' and 4 ˚34'E. Experimental design was a 2 × 2 × 3 factorial arranged into a Completely Randomized Block Design consisting of two levels of plant methods: drilling and broadcasting, two levels of seed density: 4 spoons and 8 spoons of seeds, and replicated three times.

RESULTS

PLATE 1: (a) *Solanum macrocarpon* and (b) *Solanum nigrum*

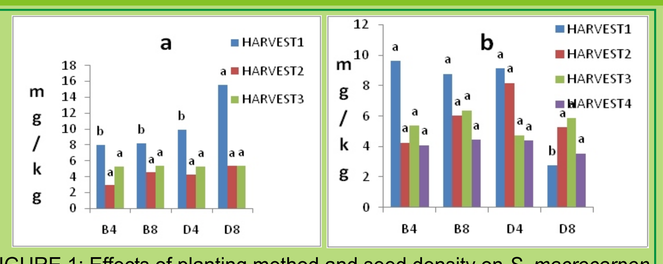

FIGURE 1: Effects of planting method and seed density on *S. macrocarpon* shoot yield. In this figure and others, values bearing different alphabets along the same char are significantly different ($p < 0.05$).

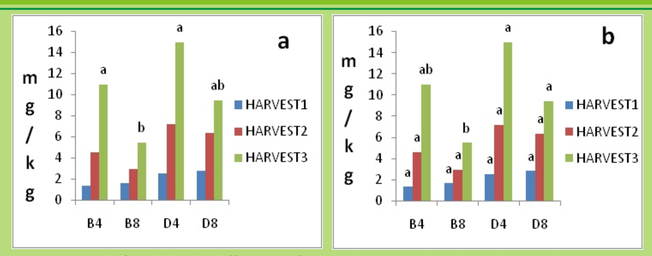

FIGURE 2: Effects of planting method and seed density on *S. nigrum* shoot yield

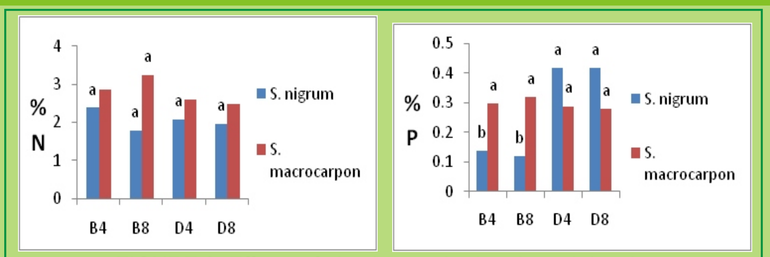

FIGURE 3: Effects of planting method and seed density on N and P contents of the plant shoot

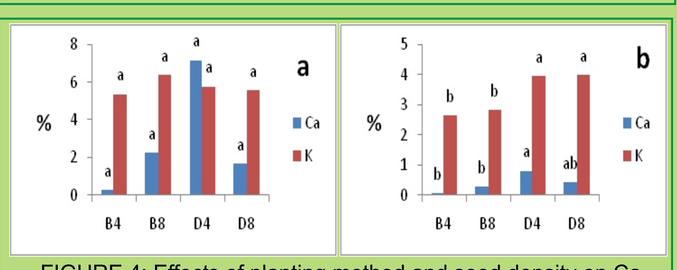

FIGURE 4: Effects of planting method and seed density on Ca and K contents of (a) *S. nigrum* and (b) *S. macrocarpon* plant shoot

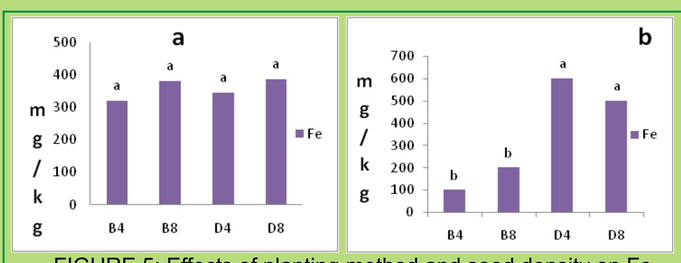

FIGURE 5: Effects of planting method and seed density on Fe content of (a) *S. nigrum* and (b) *S. macrocarpon* plant shoot

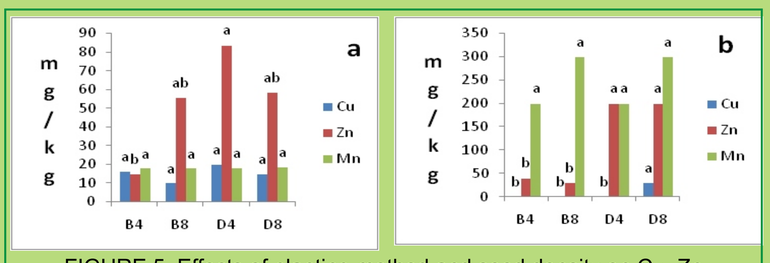

FIGURE 5: Effects of planting method and seed density on Cu, Zn and Mn contents of (a) *S. nigrum* and (b) *S. macrocarpon* plant shoot

TABLE 1: Effects of planting method and seed density on Ca/P of *S. nigrum* and *S. macrocarpon* plant shoot

Treatment		Ca:P	
PM	SD (Spoons)	*S. nigrum*	*S. macrocarpon*
B	4	9.57a	0.20b
B	8	14.08a	0.97ab
D	4	17.17a	4.07a
D	8	5.69a	0.67ab

TABLE 2: Effects of planting method and seed density on Na/K of *S. nigrum* and *S. macrocarpon* plant shoot

Treatment		Na/K	
PM	SD (Spoons)	*S. nigrum*	*S. macrocarpon*
B	4	0.03a	0.01a
B	8	0.01a	0.01a
D	4	0.02a	0.01a
D	8	0.01a	0.01a

PM = planting method; SD = seed density. In these tables, values bearing different alphabets along the same column are significantly different ($p < 0.05\%$).

Discussion

Figures 1 and 2 showed that the highest cumulative edible shoot yield was about 3 kg m^{-2} for *S. nigrum* and *S macrocarpon*.

Depending on crop species, previous studies have established that nutrient requirements for optimal plant growth are between 2 and 5 % for N, 0.3 and 0.5 % for P, 0.1 and >5.0% for Ca and 2 and 5 % for K (Marcshner, 1998). Critical toxicity contents for Fe are above 500 $mgkg^{-1}$, deficiency contents for Mn in plants are between 10 and 20 $mgkg^{-1}$ while toxicity varies widely between 200 and 5300 $mgkg^{-1}$. Critical toxicity contents for Cu in plant leaves are above 20 to 30 $mgkg^{-1}$ (Marschner, 1998). Results of our study showed that the levels of nutrients in *S. nigrum* and *S. macrocarpon* were sufficient for optimal growth and below toxicity levels, could serve as cheaper source of Fe, Zn, and Mn for women and children.

Calcium and Phosphorus are important in bone, teeth and muscle metabolism (Turan, 2003). Food is considered "good "if the Ca/P ratio is > 1 but poor if < 0.5. In our study, *S.nigrum L*. had higher Ca/P ratio compared with *S. macrocarpon*, and plant in drilling at 4 spoons was the best treatment of the vegetables (Table 1).

Sodium and potassium are important intracellular and extracellular cations. The Na/K ratio are important in determining the health status of an individual. A ratio of less than one has been recommended to prevent high blood pressure (FND, 2002). In Table 2, our vegetables produced Na/K ratio less than one, which is in consonance with recommended ratio.

Planting in drilling would be more beneficial because fertilizer application, weeding, pests control, water application (if required) and harvesting are carried out more efficiently compared with planting by broadcasting.

Conclusion

The study revealed that planting methods and seed density affected yields and quality of edible shoot of *S. nigrum* and *S macrocarpon*. *S. nigrum* and *S. macrocarpon* could be cheap source of Fe, Zn and Mn. The nutrient concentrations of the vegetables fell within the recommended levels for optimal plant growth and for human consumption. The best quality *S. macrocarpon* with Ca/P value of 4.07 was achieve at a seed rate of 4 spoonfuls / 9 m^{-2} planted in drill. The study concluded that planting in drill at 4 spoons 9 m^{-2} is the optimum seeding population for *S. macrocarpon* and *S. nigrum.*

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References

Baitilwake, M.A, De Bolle S., Salomez, J.,Mrema, J.P. and De Neve, S. 2011. Effects of manure nitrogen on vegetable yield and nitrogen efficiency in Tanzania. International *Journal of Plant Production.* 5 (4), 418-429.

Fixen, P.E. 2009. Nutrient use efficiency in the context of sustainable agriculture. *IPNI Symposium on Nutrient Use Efficiency at the Latin American Congress of Soil Science.* San Jose, Costa Rica, November 16-20, 2009.

FND 2002. Food and nutrition board; Dietary reference intake for Energy, Carbohydrate, Fibre, Fat, Fatty Acids, Cholesterol, Protein and Amino acid (micro-nutrient). *Institute of medicine. National Academy of Sciences*. The National Academies Press Washington D.C. pp. 107-967.

Marschner, H. 1998. Functions of mineral nutrition. *Mineral Nutrition of Higher* Plants. Academic Press. London. 229 - 434

Turan M, Kordali S, Zengin H, Dursun A, Sezen Y 2003. Macro and Micro- Mineral content of some wild edible leaves consumed in Eastern Anatolia. Acta Agriculture candinavica, Section B, Plant Soil Science 53: 129-137.

Van Epenhuijsen, C.W. 1974. Growing native vegetables in Nigeria. Food and Agriculture Organization of the United Nations Rome, 82-89.