Variation in Flowering Habit of *Solanum species* (Garden Egg Plant)

N. E. Abu and C. Ukwunnah
Department of Botany, University of Nigeria, Nsukka

Corresponding author: Abu, N. E. Department of Botany, University of Nigeria, Nsukka

Abstract

A preliminary study preceding a breeding project on seven species of Solanum (garden egg plant) was conducted in Botanical garden, University of Nigeria, Nsukka. The experimental design was a completely randomized design of five replications. The result showed that the number of days to flowering varied from 73 to 101 DAP while days to 50% of the plants to flower varied from 87 to 115 DAP in S. sanctum and S. macrocarpon respectively. Inflorescence type varied from solitary flower to raceme to whorl type. The flower colour is purple in S. macrocarpon and white in six others. Individual flowers opened between 7 and 14 days from bud stage. The stigma position at anthesis showed a height above the anthers in five of the lines and below the anthers in S. guineense and S. muricatum.

Introduction

Garden egg is a vegetable crop belonging to the family Solanaceae. The genus *Solanum* which includes both edible and non edible species is one of the 75 general that make up the family Solanaceae (Schippers, 2000). The family is one of the largest families of vegetables which are essentially tropical in origin. It is one of the most important vegetables. Schippers (2000) noted that garden eggs are second in importance among cultivated vegetables in Ghana whereas in Senegal their economic importance equals that of tomatoes. It is important to note, as has also been reported by several researchers that all species of *Solanum* contain the alkaloid "Solanine" to some extent, some contain the alkaloid in high concentrations and are therefore poisonous, and most wild species belong to this group (Epenhuijsen, 1994). Epenhuijsen 1994 also noted that some West African species are edible, these include *S. nigrum, S. incanum, S. gilo, S aethiopicum, S. macrocarpon* (only fruits are edible) and so on.

They can be eaten fresh without the need for any elaborate preparation. Ene-Obong and Nzelu (1985) reported that depending on the type, either the leaves and young shoots or the fruits or both are eaten, they may be consumed either raw, dried, cooked or in salad form. Omidiyi (1977) conducted the chemical analysis of *Solanum* fruits; the results showed crude protein 34.3%, moisture 87.17%, dry matter 12.82%, ash 20.10%, P.044%, K.2.4%, Ca.0.11% and crude fibre 10.5%

The indigenous *Solanum* species exhibit different morphological characters in growth habits, floral and fruit colouration, fruit shapes and sizes (Omidiyi 196). Few of these differences have been genetically investigated. Choudhuri (1972) studied the inheritance of fruit colour, leave lobbing and plant height in the local *Solanum melogena* and reported that the mode of inheritance of these characters was monogenic. Franceschetti and Lepori (1985) described the mode of natural pollination in different environments and noted that cross-pollination varies from 10% to 29%. Pathare et al 1996 also reported that the most certain way to control pollination is by carrying out hand pollination and that pollination with a matchstick combined with a cotton cover gave the highest average number of seeds/fruit

The study was initiated to address the following objectives.

1. To generate knowledge on the flowering time of garden egg
2. To show the quantitative and qualitative characters that are of interest to the breeder.

Materials and Methods

The seven species of *Solanum* used in this work were collected from different towns in three states of the country (Table 1).

Table 1: *Solanum* spp and their collection centres

Name	Area of collection	
	Town	State
S. macrocarpon	Ovim	Abia
S. aethiopicum	Ibagwa	Enugu
S. guineense	Lokoja	Kogi
S. muricatum	Enugu	Enugu
S. anguivi	Abangwa	Abia
S. fistolosum	Abangwa	Abia
S. sanctum	Nsukka	Enugu

The species collected were planted out for screening. Seven nursery baskets with equal volume of 3:2:1 top soil; poultry manure: river sand were used. The seedlings were transplanted to polybags four weeks after planting. The experimental design was completely randomized design (CRD) of five replications. The poly bags were filled with equal volume of soil and poultry manure mixture. Data was collected and analysed.

Results and Discussion

Tables 2 and 3 show the records on qualitative and quantitative characters of the seven species studied. The number of days to first flowers varied from 73 to 101 days after planting. The number of days when 50% of the plants in each species were in flower was observed to vary from 87 to 115 days. The earliest flowering time was 73 days as in *S.*

Table 2: Records on the qualitative floral characters of *Solanum* spp (garden egg plant)

Variety	Type of inflorescence	The flower colour	Anther/stigma position at anthesis
S. macrocarpon	Whorl	Purple	Stigma above the anthers
S. aethiopicum	Simple laceme	White	Stigma above the anthers
S. guineense	Simple laceme	White	Stigma below the anthers
S. muricatum	Simple laceme	White	Stigma below the anthers
S. anguivi	Simple laceme	White	Stigma above the anthers
S. fistolosum	Simple laceme	White	Stigma above the anthers
S. sanctum	Solitary	White	Stigma above the anthers

Table 3: Records on the quantitative floral characters of *Solanum* spp (garden egg plant)

Solanum spp	No of inflorens-cence/ plant	No of flowers/ inflorens-cence/ plant	No of flowers that reached anthesis/ Plant	No of flower that formed fruits	Days after planting (DAP) to flowering	DAP to 50% flowering	No of days to flower opening from bud stage	Percent fruit set %
S. macrocarpon	9	3-9	19.33	10.00	101	115	8	51.17
S. aethiopicum	7	1-5	25.00	17.66	76	90	9	70.0
S. guineense	5	2-6	8.66	6.66	78	92	7	76.91
S. muricatum	6	2-9	24.00	17.00	77	91	10	70.83
S. anguivi	21	3-13	71.66	53.66	78	92	9	74.88
S. fistolosum	7	1-4	20.33	11.00	90.3	104.3	10	54.11
S. sanctum	6	1-2	11.00	8.33	73	87	14	75.27

sanctum and the latest 101 days as in *S. macrocarpon*. By knowing the flowering time of each species, the planting date can be arranged for breeding purposes. The early flowering species like *S. sactum* should be planted one month later than *S. macrocarpon* in a breeding project involving the two species.

The inflorescence is a raceme consisting of individual flowers in *S. aethiopicum, S. guineense, S. muricatum, S. anguivi* and *S. fistolosum*, a whorl of 3-9 individual flowers in *S. macrocarpon* and solitary flowers of two pedicels per node in *S. sanctum*. The number of inflorescence per plant varied from 5 in *S. sanctum* to 21 in *S. anguivi*, however not all the inflorescence produced fruits and not all the flowers in each inflorescence matured to produce fruits. Considering the number of flowers that matured (reached anthesis) only a certain percentage matured into fruits. The percentage fruit set varied from 51.17% to 76.91 in *S. macrocarpon* and *S. guineense* respectively. *S. anguivi* with as many as 21 inflorescences per plant, 3-13 flowers per inflorescence and 74.88% fruit set (Table 3) is of interest to the breeder. The fruit however is small in size, more bitter than others and have low market acceptability. This can be crossed with any of the following with cherished fruits – *S. guinense, S. fistolosum, S. muricatum*, with only 5,7 and 6 inflorescences per plant, and a maximum of 6, 4 and 9 flowers per inflorescence, for increase in these fruit set parameters that may lead to increase in fruit set. Individual flower needs 7 to 14 days to open from buds in different species however some drop without reaching anthesis. The knowledge of this will help the breeder to know the species with high flower abortion and consequently increase his carefulness in handling flowers during emasculation. Also the knowledge of flower opening serves as a guide to the right time for emasculation before the anthers dehisce. The flower colours are purple in *S. macrocarpon* and white in others. The purple coloured flowers of *S. macrocarpon* could serve as a morphological marker in a breeding experiment. The anther and stigma positions at anthesis showed anthers above the stigma in *S. guineense* and *S. muricatum* but stigma taller than the anthers in five other species. These suggest adaptation to self-fertilization in the former two species and a certain degree of outcrossing in the later five species as has been observed by Franceschetti and Lepori (1985)

References

Choudhuri, H.C (1972) Genetic Studies in some West African *Solanum melo gena*. L. Can. J. Genet. Cytol 14: 446 -449.

Ene-Obong, E.E. and Nzelu, B.N 1985 studies on resistance to natural pests and diseases in *solamum* (garden eggs). Bionature: *5* (2).

Epenhuijsen, C.W. 1974. Growing native vegetables in Nigeria. Food and Agriculture organization of the united Nations Rome.

Franceschetti, U. and Lepori G. 1985. Natural cross pollination in egg plant *Sementi sleette* 31 (6) 25.

Omidiyi, M. O. 1976. Inheritance studies in wild and cultivated local *Solanum L.* species. The Nigerian Agricultural Journal, 139(1): 102-108

Omidiyi, M. O 1977. Yield and nutritive quality of selected leaf vegetables from interspecific *Solanum* L. cross. Niger. J. Sci 11 (1+2):

Pathare S.B.; Lawande, K.E and Hinde, K.G 1996. Effect of pollination devices and covering materials on hybrids seed yield of brnijal. Journal of Maharashtra Agricultural Universities 20(3): 398 -399

Schippers, R.R. 2000. African indigenous vegetables: An overview of the cultivated species. The University of Greenwich technical centre for Agricultural and rural Cooporation. 214 pp.