*Madras agric. J.* 62 (9): 528 — 533, September, 1975.

# Cytogenetical Studies on the Interspecific Hybrid Between *Sesamum radiatum* Schum & Thonn., and *Sesamum occidentale* Heer. & Regel

By

M. SUBRAMANIAN[1]

ABSTRACT

The cytogenetic relationship between *S. radiatum* (2n : 64) and *S. occidentale* (2n=64) was studied based on their breeding and meiotic behaviour. The $F_1$ hybrids obtained were highly fertile. The data on the morphology of these two species and crossability, $F_1$ fertility, $F_2$ viable segregations and high regular behaviour of chromosomes indicated clearly that the two species *S. radiatum* and *S. occidentale* are genetically closely related, the gene exchange between these two species can easily be obtained and hence they may be considered as varieties rather than species.

## INTRODUCTION

The genus *Sesamum* comprises of about 36 species (Index Kewensis 1895, and Nayar and Mehra, 1970) and the differentiation is mostly based on morphological characters. *Sesamum occidentale* Heer. and Regel is reported to have the same chromosome number as *S. radiatum* i. e., 2n = 64 (Sampath and Ramanathan, 1949). But it needs clarification to say whether this species is the same as *S. occidentale* of Tropical Africa (Index Kewensis, 1895). In the Flora of Tropical Africa by Thiselton-Dyer (1906), *S. occidentale* and *S. radiatum* are considered to be synonymous. Ramanathan (1950) has suggested that free crosses between these two species, can be seen from the fertile $F_1$ hybrids. Therefore the separate species status given for these two species needs to be confirmed by further studies. In the present investigation hybridization was attempted between *S. radiatum* and *S. occidentale* and the results of cross-ability, morphological characters and chromosomal behaviour of the $F_1$ and $F_2$ progenies are presented in this paper.

## MATERIALS AND METHODS

Crosses were effected by hand pollination after emasculation. For study of meiosis young flower buds were fixed in Carnoy's fluid (alcohol acetic acid and chloroform mixed in the ratio of 3 : 1 : 4) with addition of traces of ferric chloride. The P. M. cells were teased in 0.5 per cent propionocarmine. The pollen grains were stained in 1 per cent iodine in potassium iodide to assess the fertility.

## RESULTS AND DISCUSSION

The description of the parental species and $F_1$ hybrids are given in Table 1. Fertile hybrids were obtained between *S. radiatum* and *S. occidentale* and their reciprocal. The fertile hybrids

1. Research Assistant (Sunflower Scheme) Agricultural College and Research Institute Tamil Nadu Agricultural University Coimbatore - 641 003.

have thrown viable and fertile $F_2$ segregants. The quantitative characters of the parents, hybrid and $F_2$ are presented in Table 2. The two kinds of hybrids obtained were morphologically similar and more vigorous than the parents and with dominance bias towards *S. occidentale*. From the fact of easy crossability, fertility, variability and viability of the $F_1$ and $F_2$ segregants it is quite clear that *S. occidentale* is closely related to *S. radiatum*.

TABLE 1. Details of morphological characters of *S. radiatum* *S. occidentale* and their $F_1$ hybrid.

| Characters | *S. radiatum* (2n = 64) | $F_1$ hybrid (2n = 64) | *S. occidentale* (2n = 64) |
|---|---|---|---|
| Habit | Annual, erect | Annual, erect | Annual. erect |
| Stem | Moderately thick, light green, glabrous. | Thick, light green with purple wash at the base with hairs | Thick, light green with purple wash at the base with hairs. |
| Branching | Moderately branching less number of primary branches and secondaries | Heavy branching with more number of primaries and secondaries | More number of primaries and secondaries. |
| Leaves | Simple, green, small to medium lower leaves cordate with serrate margin, upper leaves lanceolate to linear with entire margin opposite and decussate. | | |
| Flower | Solitary, axillary, short pedicelled, big sized, purple, small linear bracts present zygomorphic, hermophrodite filaments and style glabrous, dull white anthers, four number. | | |
| Corolla | Five, gamopetalous, bell shaped, long, irregular lobes scarlet colour five daric purple streaks present on the inner side extending from tip to middle of the flower and dark purple dots extend from the middle of the flower up to base. | | |
| Capsules | Short, robust, long hairs present acute tip dehiscent. | Medium, hairy, acute tip, bifid tip | Medium to long, dark green, acute tip dehiscent. |
| Seeds | Small, reticulate, brownish black | Medium, ovate, reticulate and black. | Medium, reticulate black. |
| Resistance to pests and diseases | Susceptible | Susceptible | Susceptible |

The study of $F_2$ population (Plate-1) indicated that the variability was high in respect of the main stem height, number of primary and secondary branches, capsule number per primary branch and leaf shape as evident from the coefficient of variability (Table 2). In respect of the length of primary branches, capsule and flower shape was conferred to the parental limits. The least variability was observed in flower size. The segregants were highly fertile and the pollen stainability ranged from 95–98 per cent.