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# Development of non-spiny brinjal from spiny brinjal through conventional breeding

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## Abstract

The Spiny brinjal (*S. melongena*) var.VRM-1 is a familiar and promising variety in Vellore district and also main dish to make a Ennai Kathirikai for briyani side dish purpose. The spines in the stalk is a major constraints for picking and handling of brinjal fruits. A breeding initiative was undertaken at Agricultural Research Station & Krishi Vigyan Kendra, Virinjipuram to mask the spiny traits through crossing programme.

The crosses were attempted to develop non-spiny brinjal with spiny quality. The both parents are pure for respective spiny and non spiny. A total of 18 crosses were made with spiny brinjal and non-spiny brinjal progenies. The true F1 was tagged in both crosses combination. In F1 plant population of Spiny x Non spiny, 100 percent of the plants expressed spiny nature. In F1 plant population of non spiny x spiny reduced percentage of partial spiny plants were observed. From this study in both cases spiny plants are observed in F1 generation which indicates spiny is expressed as dominant characters.

Further generation studies were made with continuous selfing programme and the results revealed that 100 percent non-spiny plants were obtained with high yield from cross derivative of non-spiny x spiny 3rd cross and 5th cross during fourth generation. Comparative trials were carried out during kharif 2015 and Rabi 2015-16 with spiny brinjal VRM-1. Mean performance showed that genotype non-spiny x spiny 3rd cross (1.43 kg/plant) registered the highest fruit yield per plant followed by non-spiny x spiny 5th cross (1.56 kg/plant). These genotypes could be used for further breeding programme for the improvement of fruit yield and non-spiny trait.
**Key words:** *Brinjal, breeding, non spiny*

## Introduction

Brinjal (*Solanum melongena* L.) is an important and widely consumed Solanaceous vegetable of India grown round the year. The crop is extremely variable in India substantiated by the presence of wild relatives of *Solanum melongena* which are perennial herb or shrub with bitter fruits (Bhaduri, 1951). Though the principal method used for improvement of this crop in India is selection from indigenous germplasm, yet comprehensive characterization of this crop has not been done (Choudhury, 1976). The spines in the stalk is a major constraints for picking and handling of brinjal fruits. Spiny brinjal (VRM-1Mullukathiri) is a pure line selection from Elavambadi village of Vellore district. Spines are present in the leaf, stem and calyx of the fruit. VRM-1Mullukathiri is high yielding (30-35 t/ha$^{-1}$) and most suitable for North-Eastern Zone of Tamil Nadu. Selection for non-spiny plants from the spiny brinjal population was made and Crossing work was attempted to develop non-spiny fruits. The fruit set was ranged from 80-90 per cent. An attempt has been made in the present study to develop non-spiny brinjal with spiny quality for 18 genotypes. Two crosses (i.e., Spiny x Non-spiny and Non-Spiny x Spiny) were attempted to study the inheritance of non-spiny character from Spiny brinjal. In both the crosses Non-Spiny character was obtained. Cross C1 (i.e., Spiny x Non-spiny) expressed more number of non-spiny plants. However, spiny nature was observed in both the crosses indicating the partial dominance of spiny nature in both crosses.

## Materials and Methods

The experiment was laid out in a randomized block design (RBD) with two replications. Ten genotypes (nine non-spiny genotypes and one spiny genotypes) were used for crossing programme. The crosses were attempted between spiny x non-spiny and non-spiny x spiny accessions. Nine non-spiny local accessions were crossed with VRM-1 spiny brinjal and reciprocal crosses were also made. Totally eighteen crosses were obtained. The generations were also forwarded from F1 to F5. The genotypes were evaluated and characterized for spinyness and yield. Each plot consisted of 50 plants spaced at 60 x 75 cm. Five random plants per replication were selected to record observations on these characters.

## Results and Discussion

### i)Performance of Non-spiny character in F3 generation

Two crosses i.e., Spiny x Non-spiny and Non-Spiny x Spiny was studied for the inheritance of non-spiny leaf, stem and fruits in brinjal (Table 1) in five accessions. In both the crosses Non-Spiny character was obtained. Cross C2 (i.e., Non-Spiny x Spiny) expressed more number of non-spiny plants in F2 generation.

**ii) Performance of Non-spiny character in F4 generation**

The F3 was found to be non-spiny in the cross Non-Spiny x Spiny, followed by Spiny x Non-spiny but only upto a certain extent. Eventhough, Spiny nature was observed in both the crosses (i.e., Spiny x Non-spiny and Non-Spiny x Spiny) indicating the partial dominance inheritance of spiny. But, two cross from Non-Spiny x Spiny (C2 and C5) was found to be 100 per cent non-spiny nature indicating the dominance of non-spiny.

**iii) Performance of Non-spiny character in F5 generation with yield characters**

In this generation study, the 100 percent non-spiny plants were obtained from cross derivative of non-spiny x spiny 3rd cross and 5th cross during fivth generation. These two Crosses were compared with spiny brinjal VRM-1 as yield trials in RBD during Kharif 2015 and Rabi 2015-16.

Out of 18 entries tested only two entries were selected based on single plant yield with non-spiny character. Among these two cross combination, the cross C2-5 recorded best yield performance (34.6 t/ha) on par with VRM-1 Spiny Brinjal (34.2 t/ha) (Table 3)..

The comparative trial was repeated again during Rabi 2015-16 to check the non-spiny nature in Rabi 2015-16. The selected entries revealed 100% non-spiny nature and the cross C2-5 recorded best yield performance (33.1 t/ha) (Table 4).

Non-Spiny was observed in the present study was similar to that obtained by dominance inheritance of spiny. Similar pattern of inheritance in brinjal for spiny leaf was reported earlier by Nimbalkar & More (1980) and More *et al.* (1982).

Table 1. Inheritance of Non-spiny character in parents and crosses of VRM-1 Mullukathiri in F3 generation

| | Non-spiny nature (%) | | | | | |
|---|---|---|---|---|---|---|
| | **Acc.1** | **Acc.2** | **Acc.3** | **Acc.4** | **Acc.5** | **Mean** |
| **Parents** | | | | | | |
| Spiny Brinjal | Nil | Nil | Nil | Nil | Nil | Nil |
| Non-Spiny Brinjal | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| **Crosses** | | | | | | |
| C1 (Spiny x Non-Spiny) | 95.00 | 95.83 | 99.16 | 95.83 | 95.83 | 96.33 |
| C2 (Non-Spiny x Spiny) | 88.33 | 79.16 | 75.83 | 86.66 | 85.83 | 83.15 |

† Average of three replications containing 50 plants

Table 2. Inheritance of Non-spiny character in parents and crosses of VRM-1 Mullukathiri in F4 generation

| S.No. | Crosses | Non-Spiny plants (%) | No.of spines in leaf midrib | No.of spines in leaf veins |
|---|---|---|---|---|
| Crosses | | | | |
| C1 (Spiny x Non-Spiny) | | | | |
| 1 | C1-1 | 0 | 3.0 | 2.0 |
| 2 | C1-2 | 0 | 4.0 | 2.0 |
| 3 | C1-3 | 0 | 2.5 | 3.0 |
| 4 | C1-5 | 0 | 3.0 | 1.0 |
| 5 | C1-6 | 0 | 3.5 | 1.5 |
| 6 | C1-7 | 7.69 | 4.0 | 4.0 |
| 7 | C1-8 | 0 | 3.0 | 3.5 |
| 8 | C1-9 | 0 | 4.2 | 3.0 |
| Mean | | 0.961 | 3.275 | 2.5 |
| C2 (Non-Spinyx Spiny) | | | | |
| 9 | C2-1 | 81.42 | 1.0 | 0.5 |
| 10 | C2-2 | 85.20 | 1.5 | 1.2 |
| 11 | C2-3 | 100 | 0 | 0 |
| 12 | C2-4 | 88.24 | 1.3 | 1.5 |
| 13 | C2-5 | 100 | 0 | 0 |
| 14 | C2-6 | 87.15 | 1.4 | 1.7 |
| 15 | C2-7 | 80.46 | 1.4 | 2.1 |
| 16 | C2-8 | 80.53 | 1.5 | 2.5 |
| 17 | C2-9 | 85.27 | 1.1 | 1.7 |
| 18 | C2-10 | 88.34 | 1.7 | 2.2 |
| Mean | | 87.66 | 1.09 | 1.34 |
| Parents | | | | |
| 1 | Spiny Brinjal | 0 | 4.5 | 3.5 |
| 2 | Non-SpinyBrinjal | 100 | 0 | 0 |

Table 3. Yield of selected two entries in Kharif 2015

| S. No | Entries | Non-spiny nature (%) | Fruit yield/plant (kg) | | | | Fruit yield (t/ha) | % of yield increase over check |
|---|---|---|---|---|---|---|---|---|
| | | | RI | RII | RIII | Mean | | |
| 1 | C2-5 | 100 | 1.52 | 1.63 | 1.54 | 1.56 | 34.6 | 1.15 |
| 2 | C2-3 | 100 | 1.72 | 1.65 | 1.52 | 1.43 | 31.7 | -7.88 |
| Check | | | | | | | | |
| 1 | VRM-1 Spiny Brinjal | 0 | 1.57 | 1.65 | 1.42 | 1.54 | 34.2 | - |

Table 4. Yield of selected two entries in Rabi 2015-16

| S. No | Entries | Non-spiny nature (%) | Fruit yield/plant (kg) | | | | Estimated fruit yield (t/ha) | % of yield increase over check |
|---|---|---|---|---|---|---|---|---|
| | | | RI | RII | RIII | Mean | | |
| 1 | C2-5 | 100 | 1.61 | 1.51 | 1.36 | 1.49 | 33.1 | 4.22 |
| 2 | C2-3 | 100 | 1.23 | 1.34 | 1.41 | 1.32 | 29.3 | -8.19 |
| Check | | | | | | | | |
| 1 | VRM-1 Spiny Brinjal | 0 | 1.44 | 1.52 | 1.34 | 1.43 | 31.7 | - |

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