

**INFLUENCE OF PRUNING, METHODS OF
POLLINATION AND METHODS OF FIXING THREADS
ON SEED YIELD OF HYBRID CHILLI**

(Capsicum annum L.)



BY

A.L.T.D. PERERA



FAG529



Project Report
Library - EUSL

FACULTY OF AGRICULTURE

EASTERN UNIVERSITY

SRI LANKA

2018

PROCESSED
Main Library, EUSL

ABSTRACT

Chilli (*Capsicum annum* L.) is one of the most important cash crops grown in the world including Sri Lanka. There is not an adequate production of chilli in Sri Lanka due to lower yield. Such low yields are mainly due to high incidences of biotic stresses and abiotic stresses. Therefore, developing hybrid is the best way to get the higher yield with resistance to biotic and abiotic stresses. The present study was carried out in a semi - intensive polytunnel at CIC Seed Farm, Pelwehera to find the influence of pruning, methods of pollination and methods of fixing threads on seed yield of the first chilli hybrid, MICH HY 01. This hybrid was developed and released by the Department of Agriculture by using MI Waraniya 1 inbred line as a male parent and Galkiriyagama inbred line as a female parent.

The experiment was conducted with eight treatments in a Randomized Complete Block Design (RCBD) with three replicates. Early collected pollen and direct pollen from chilli male flowers were used for the pollination of the female flower bud. It was practiced in both pruned and non-pruned plants. Two types of threads application methods (Cow hitch knot and Overhand knot) were practiced for the identification of crossed buds. Nine characters (total numbers of crosses, success percentage (%), length of fruit (cm), diameter of fruit (mm), weight of fruit (g), number of seeds per fruit, dry seeds weight per fruit (g), 1000 seeds weight (g) and germination percentage (%) were tested. The results revealed that a significantly ($P < 0.05$) higher number of crosses (329.33) were obtained when pollination is done by early collected pollen with cow hitch knot method. Significantly higher success percentage of fruits (39.69) was observed in fixing threads by using cow hitch knot method. Non-significant results for length of fruit (cm), diameter of fruit (mm), weight of fruit (g), number of seeds per

fruit, dry seeds weight per fruit (g), 1000 seeds weight (g), and germination percentage (%) were observed irrespective of the treatments.

This result suggests that either pruned or non-pruned plant had no significantly influence on seed yield of MICH HY 1 hybrid chilli and either direct pollen or early collected pollen did not influence the seed yield of MICH HY 1 hybrid chilli. However, in same time period (30 min.) higher number of pollinations was found by using early collected pollen than direct pollen. Therefore, this result suggests that pollination by using early collected pollen is the most efficient method for the seeds production of hybrid chilli (MICH HY I). This result suggests that cow hitch knot method is most suitable for the identification of the crossed buds of hybrid chilli (MICH HY I). These finding would be helpful for the farmers who prefer to produce hybrid chilli seeds in commercially to obtain high yield with high quality under polytunnel condition.

Key words: Chilli, Hybrid seed production, pruning, pollination, tagging, pollination

TABLE OF CONTENT

ABSTRACT	I
ACKNOWLEDGEMENT	III
TABLE OF CONTENT	IV
LIST OF TABLES	VIII
LIST OF FIGURES	X
LIST OF PLATES	XI
ABRIVIATION	XII
1. INTRODUCTION.....	1
1.1 Objectives	4
2. REVIEW OF LITERATURE.....	5
2.1 General description of <i>Capsicum</i>	5
2.2 Taxonomy of chilli	6
2.3 Morphology and growth of chilli	6
2.4 Chilli cultivation.....	7
2.4.1 World scenario.....	7
2.4.2 Sri Lanka scenario	9
2.4.3 Recommended varieties of chilli	11
2.4.4 Nutrient composition of <i>Capsicum</i>	15
2.4.5 Benefits of chilli.....	16
2.5 Hybrid development	18
2.5.1 Hybrid chilli.....	19

2.5.2 Hybrid chilli varietal development in Sri Lanka	20
2.5.3 Hybrid seed development under a polytunnel	20
2.5.4 Effect of pruning in hybrid chilli yield	22
2.6 Steps of hybrid seed production	22
2.6.1 Parental lines	22
2.6.1.1 Flowering	22
2.6.1.2 Flower morphology	23
2.6.1.3 Flower opening (anthesis)	23
2.6.2 Stigma receptivity	24
2.6.3 Pollen viability	25
2.6.4 Hand emasculatation	26
2.6.5 Hand pollination and fertilization	27
2.6.6 Tag application	28
3. MATERIAL AND METHODS	29
3.1 Experimental location and soil	29
3.2 Climate	29
3.3 Parental materials	29
3.3.1 MI Wraniya 1	30
3.3.2. Galkiriyagama	31
3.4 Experiment	33
3.4.1 Treatments used in this experiment	33
3.4.2 Experimental design	34

3.5 Agronomic practices.....	36
3.5.1 Nursery preparation	36
3.5.2 Field preparation.....	37
3.5.3 Transplanting	37
3.5.4 Cultural Practices.....	37
3.5.4.1 Irrigation.....	37
3.5.4.2 Pruning.....	38
3.5.4.3 Fertigation	38
3.5.4.4 Weed management.....	39
3.5.4.5 Pest and disease control	39
3.5.4.6 Special management practices	39
3.5.4.6.1 Fan and pad evaporative cooling systems	39
3.5.4.6.2 Fog system.....	40
3.5.4.7 Material required for pruning, collection of pollen, pollination and fixing threads.....	40
3.6 Experimental procedure	42
3.6.1 Collection of pollen	42
3.6.2 Pollination methods	42
3.6.3 Fixing thread to the pollinated buds	43
3.7 Data collection.....	45
3.7.1 Total number of crosses.....	45
3.7.2 Success percentage of fruits (%).....	45

3.7.3 Length of fruit (cm)	45
3.7.4 Diameter of fruit (mm)	45
3.7.5 Weight of fruit (g).....	46
3.7.6 Number of seeds per fruit	46
3.7.7 Dry weight of seeds per fruit (g).....	46
3.7.8 1000 seeds weight (g)	46
3.7.9 Germination percentage (%).....	47
3.8 Data analysis.....	47
4. Result and Discussion.....	48
4.1 Total number of crosses.....	48
4.2 Success percentage of fruits (%)	49
4.3 Length of fruit	54
4.4 Diameter of fruit.....	55
4.5 Weight of fruit.....	57
4.6 Number of seeds per fruit.....	58
4.7 Dry weight of seeds per fruit	60
4.8 1000 Seeds weight.....	61
4.9 Seed germination percentage (%).....	62
CONCLUSION.....	67
SUGGESTIONS	69
REFERENCES.....	70