DISSERTATION-I

SYNOPSIS

SUBMITTED BY

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(11719054)

In partial fulfillment for the award of the degree

of

Master of Science in Horticulture

(Vegetable Science)

Under the Guidance of

Dr. Monisha Rawat

Assistant Professor (Vegetable Science)

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Phagwara-144411 Punjab, India

14th May,2018

DECLARATION

I hereby declare that the synopsis entitled **"Studies on integrated nutrient management in chilli (*Capsicum annum* L.) genotypes''** is an authentic record of my work that will be carried out at Lovely Professional University as a requirement for the degree of **Master of Science** in discipline of **Horticulture (Vegetable Science)**, under the guidance of Dr. Monisha Rawat, Assistant Professor, Department of Horticulture, School of Agriculture and no part of this synopsis has been submitted for any other degree programme.

Amaravarapu Mallika

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CERTIFICATE

This is to certify that the synopsis entitled **"Studies on Integrated Nutrient Management in chilli (*Capsicum annum* L.) genotypes''** is submitted in the partial fulfillment of the requirement for the degree of **Master of Science** in the discipline of **Horticulture (Vegetable Science)** is a research work that will be carried out by **Amaravarapu Mallika (Registration No. 11719054)** under my supervision and that no part of this synopsis has been submitted for any other degree.

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INTRODUCTION

Chilli (*Capsicum annuum* L.) (2n =24) is an important vegetable crop belonging to the nightshade family i.e. solanaceae. **(Purdue University, 2009).** It is widely used in many cuisines to add spiciness to dishes. The substances responsible for pungency in chilli peppers when ingested or applied topically are capsaicin and related compounds known as capsaicinoids. **(Dasgupta, 2011).** Chilli peppers originated in Mexico, after the Columbian exchange. Many cultivars of chilli pepper spread across the world are used for both food and traditional medicine. During 2014, 32.3 million tonnes of green chilli peppers and 3.8 million tonnes of dried chili peppers were produced throughout the world. China is the world's largest producer of green chillies, providing half of the total global production. **(Faostat, 2017).**

Chillies have been a part of the human diet in the Americas since 7500 BC. The most recent research shows that chilli peppers were domesticated more than 6000 years ago in Mexico, in the region that extends across Southern Puebla and Northern Oaxaca to South Eastern Veracruz, **(Eurekalert, 2014)** and were one of the first self-pollinating crops cultivated in Mexico central and parts of South America. **(Bosland, 1998).**

Peru is considered the country with the highest cultivated capsicum diversity because it is the center of diversification where varieties of all five domesticates were introduced, grown and consumed during pre-Columbian times. Bolivia is considered to be the country where the largest diversity of wild capsicum peppers are consumed. **(Williams, 1995).**

India produced 36.57 tonnes of chilli from an area of 39.19 hectares in 2013. This accounted for about 27.24 per cent of the total area under spice cultivation and 25.65 per cent of total spice production in India. **(Damodara, 2004).** Andhra Pradesh stands first in the list of major chilli producing states in India and also has the maximum acreage under chilli cultivation in the country. It alone commands 57.80 per cent of the chilli production in India **(Velayutham, 2015)** with a production of around 7.7 lakh tonnes of chilli, followed by Karnataka (12.40 %), Orissa (4.82 %), West Bengal (4.80 %), Maharashtra (3.55 %), Gujarat (3.53 %) and Tamil Nadu (3.22 %). The major chilli producing states in India viz. Andhra Pradesh, Karnataka, Orissa, West Bengal, Maharashtra, Gujarat and Tamil Nadu contribute around 83 per cent of the total area under chilli cultivation in the country and 90 per cent of the total production.

India is the major consumer of chilli followed by China, Mexico, Thailand, USA, UK, Germany and Sweden. The major importers of Indian chilli are USA, Sri Lanka, Bangladesh, Nepal, Mexico, Canada, UK, Saudi Arabia, Singapore, Malaysia and Germany.

Though Indian exports are showing satisfactory trends, nowadays India is facing a very tough competition in the international export market as price of the Indian chilli powder is considered too high and other competing countries are providing chilli at very competitive rates to the major importing countries. The exports can be further improved, provided India is able to meet the strict quality demands of the international market. Steps have to be taken by the government to encourage exporters.

PROBLEM BACKGROUND

The experiment will be conducted to study the effect of integrated nutrient management on highly pungent chilli genotypes introduced from South India to North India and to evaluate the performance of different chilli genotypes. And also to find out whether the climate of North India favours the growth and development of highly pungent south Indian chilli genotypes. Whether farmers of Punjab region can include these genotypes for commercial cultivation.

REVIEW OF LITERATURE

SubbaRao *et al.* (2001) defined the soil testing for targeted crop response, effect of sight specific nutrient management through targeted area yield approach on yield and nutrient uptake of chilli. **Jackson (1967)** reported that nitrogen, phosphorus and potassium content in plant samples were estimated by MicroKjeldahl method, Vanado-molybdate phosphoric yellow colour method and Flame photometer method, respectively. **Kanner *et al.* (1977)** reported that an increase in percentage of white fruits might be due to the imbalance between nitrogen and carbon assimilation in fruits leading to higher synthesis of oxalic acid which chelates with calcium to form calcium oxalate leading to discolouration of pericarp.

Acharya et al. (2007) reported sufficient genetic variability for many of the horticultural traits studied in chilli genotypes and considerable scope for its improvement. **Al-Jibouri *et al.* (1958)** reported that the phenotypic and genotypic coefficient of variability were calculated according to the method suggested by Burton and De Vane. Heritability (broad sense), genetic advance and correlation were calculated according to the methods suggested.

Mishra *et al.* (1998) observed that the estimates of PCV and GCV were high for fruit yield per plant, number of fruits per plant, capsaicin content and average fruit weight, moderate for days to first harvest. **Das and Choudhary (1999)** reported that selection could be made for almost all the traits on the basis of phenotypic expression. High heritability estimates were observed for fruit yield per plant and average fruit weight. **Bhardwaj *et al.* (2007)** observed fruit yield per plant (99.60 and 88.98), capsaicin content (99.10 and 81.43), number of fruits per plant (98.00 and 85.43). High heritability and high genetic advance have also been obtained.

Ibrahim *et al*.(2001) reported that high heritability along with moderate to low genetic advance was observed for average fruit weight, days to first harvest, days to flower anthesis, number of branches, fruit length and fruit diameter. **Manna and Paul (2012)** reported that significant association for average fruit length, number of fruits, fruit length suggests that increase in any one of these traits may result in increase in fruit yield per plant and low for ascorbic acid content. **Patil (1998)** reported that the screening of genotype variety is most important for getting higher yield as well as higher income and international market. With respect to management, nutrient management is most important factor for higher productivity.

Ramakrishna *et al.* (2002) reported that there is better performance of Vietnam-2 under zone 8 with respect to yield and yield parameters, the Vietnam-2 showed significantly higher number of fruits per hill (53.0) and fruit yield (932 kg/ha) as compared to Byadagi Kaddi (849kg/ha) and Byadagi Dabbi (744kg/ha). **Subbaiah *et al.* (1982)** reported that the better growth components may be attributed to increase in availability of nutrients for longer period and continuous supply of nutrients.

Roychoudary *et al.* (1990) reported that with respect to yield component FYM @ 10 t/ha with 100 % RDF showed significantly higher number of fruits per hill (54.8), fruit length (14.2 cm) and fruit yield as compared to other organic and inorganic fertilizers.

PROPOSED RESEARCH OBJECTIVES

1. To evaluate the performance of South Indian chilli genotypes in North Indian climate
2. To check the response of different organic and inorganic fertilizers on the growth and performance of chilli genotypes
3. To compare the yield of different chilli genotypes
4. To evaluate the quality attributes of different chilli genotypes

PROPOSED RESEARCH METHODOLOGY

Name of experiment: Studies on integrated nutrient management in chilli (*Capsicum annum* L.) genotypes

Location: The experiment will be conducted on Agriculture Research Farm, LPU, Phagwara.

Experimental details:

1) Year of experiment = 2018

2) Dose of fertilizer = Recommended dose (N P K)

3) No. of treatments = 15

4) No. of replications = 3

5) Plot size = 300 meter square

6) Date of sowing = June – July (2018)

7) Experimental design = Split plot design

- Main plot: Different fertilizers
- Sub-plot: Varieties

8) Crop = Chilli

9) Spacing = 60*60 cm

Parameters:

1) Plant height (cm)

2) Number of branches per plant

3) Leaf area index

4) Internodal length (cm)

5) Canopy spread (cm)

6) Dry matter production (g/hill)

7) No of fruits per plant

8) Length of pod (cm)

9) Weight of pod (g)

10) Total pod yield (q/ha)

11) Chlorophyll content of leaf (mg/m^2)

Soil analysis will be done and following parameters will be calculated:-

Parameters	**Methods**
Nitrogen	Kjeldahl method
Phosphorus	Olsen P method
Potassium	Flame photometer
pH	pH meter
EC	Electrical conductivity meter

EXPECTED RESEARCH OUTCOMES

On the basis of the response of different organic and inorganic fertilizers on the growth and performance of chilli genotypes, the same can be recommended to the farmers of this region for commercial cultivation.

REFERENCES

Acharya, P., Sengupta, S. and Mukherjee, S. (2007). Genetic variability in pepper (*Capsicum annuum*).*Env and Ecol*. 25(4): 808-812.

Al-Jibouri, H.A., Miller, P.A. and Robinson, H.F. (1958). Genotype and environmental variances and co-variances in an upland cotton cross of interspecific origin. *Agron. J.*, 50: 633-636.

Bharadwaj, D.N., Singh, H., Yadav, R.K. (2007). Genetic variability and association of component characters for yield in chilli (*Capsicum annuum* L.). *Prog. Agri*., 7(1-2): 72-74.

Das, S. and Choudhary D.N. (1999). Genetic variability in summer chilli (*Capsicum annuum* L.). *J. Appl. Biol*., 9(1):810.

Jackson, M.L. (1967). Soil Chemical Analysis, Prentice Hall of India Pvt. Ltd., New Delhi, pp. 38-82.

Johnson, H.W.,Robinson, H.F. and Comstock, R.E. (1955). Estimates of genetic and environmental variability in soybean. *Agron. J*., 47: 314-318.

Kanner,Palevitch J., Stella, Harel, D. and Ben-gera (1977). Colour retention in sweet red paprika (*Capsicum annuum* L.) powder as affected by moisture contents and ripening stage. *J. Food Tech*., 12: 59-64.

Manna, M. and Paul, A. (2012). Studies on genetic variability and character association of fruit quality parameters in chilli. *HortFloraRes. Spect*., 1(2): 110-116.

Mishra, Y.K., Ghildiyal, P.C., Solanki, S.S., and Joshi, R.P. (1998). Correlation and pathanalysis in sweet pepper (*Capsicum annuum* L.). *Recent Hort*., 4: 123-126.

Patil, S.R. 1998. Studies on fertilizer requirement of chilli. *Ind. Cocoa Arecanut and Spice J*., 22: 47-51.

Roychoudary, A., Chatterjee, R. and Mitra, S.K., 1990. Effect of different doses of nitrogen, phosphorus, potassium, magnesium, calcium, and iron on growth and development in chilli. *Ind. Cocoa, Arecanut and Spices J*, 13: 96-99.

Sreelathakumary, J. and Rajamony, L.(2002). Variability, heritability and correlation studies in chilli (*Capsicum spp*.) under shade. *Indian J. Hort. Sci*., 59: 77-83.

SubbaRao, A. and Srivastava, S. (2001). Soil Testing for Targeted Crop Response. Fifty Years of Natural Resource Management Research, pp. 230-244.

Subbaiah, K. Helhiah, J.R., V. and Rajagopal, C.K.1982. Effect of combination application of organic and inorganic fertilizers on the yield and nutrient uptake of MDU-1 chilli. *South Ind. Hort*., 30: 45-47.

Ukkund, K.C., Patil, M.P., Madalageri, M.B., Mulage, R. and Jagadeesh, R.C. (2007). Variability studies in green chilli(*Capsicum annuum* L.). *Karnataka J. Agri. Sci*. 20(1): 102-104.