SYNOPSIS

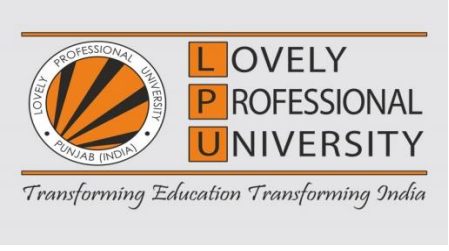
GENETIC CORRELATION AND PATH ANALYSIS IN CHILLI

SUBMITTED IN PARTIAL FULFILMENT OF REQUIREMENTS OF THE

AWARD OF DEGREE OF

MASTERS OF SCIENCE IN HORTICULTURE

VEGETABLE SCIENCE



SUBMITTED BY

TEJINDERPAL KAUR

11718012

UNDER THE GUIDANCE OF

DR. SMITA KUMARI

DEPARTMENT OF HORTICULTURE

SCHOOL OF AGRICULTURE

LOVELY PROFESSIONAL UNIVERSITY

PHAGWARA

DECLARATION

I hereby declare that this synopsis entitled **"Genetic Correlation and Path analysis in Chilli (*Capsicum annum)*''** is an authentic record of my work carried out at Lovely Professional University as requirement for the degree of **Master of Science** in discipline of **Horticulture (Vegetable Science)**, under the guidance of Dr. Smita Kumari Assistant Professor, Department of Horticulture , School of Agriculture and no part of this Synopsis has been submitted for any other degree programme.

Tejinderpal Kaur

Reg. No. 11718012

Date -14-05-2018

CERTIFICATE

This is to certified that this synopsis entitle "**Genetic Correlation And Path Analysis In Chilli(*Capsicum annum*)**" submitted in partial fulfilment of requirement of Degree of Masters In Science in Horticulture Vegetable Science by **Tejinderpal Kaur, Reg. No.- 11718012** ,To the Department of Horticulture, School of Agriculture, Lovely Professional University, has been formulated and finalized by student herself on the subject.

Signature of Research Supervisor:-

Dr. Smita Kumari

Designation:-Assistant Professor

Under the Co-Guidance of

Dr. Madhusmita Disri

Assistant Professor

Department of Horticulture

School of Agriculture

Lovely Professional University

Phagwara, Punjab

Date: 14-05-2018

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INTRODUCTION

Chilli (*Capsicum annuum* L.) is a spice cum vegetable crop belonging to the family Solanaceae with chromosome number is 2n = 24. It is a native of Mexico, which was brought into India from Brazil by Portuguese prior to 1785 AD. (Thamburaj S (2016) Textbook of Vegetables,Tubercrops and Spices.New Delhi, Indian Council of Agricultural Research,469pp).

It contributes to 80% of total area and production. Area of chilli production under India is 0.982-0.816 million ha and production is 61,82,000 tonnes for green chilli and for dry chilli it is 86,200 tonnes per hectare. It can be regarded as universal spice of India. Owing to its high cash value and consumption rate, the annual trade of chilli is approximately 17 per cent of total spice trade in the world. Chilli is grown in all parts of India and is largely cultivated in Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, Orissa, West Bengal, Rajasthan and Tamil Nadu in that order and accounts for more than 80% of total area and production. (Krishna et al. 2007).

Area of chilli production under India is 0.982-0.816 million ha and production is 61,82,000 tonnes for green chilli and for dry chilli it is 86,200 tonnes per hectare. Andhra Pradesh is leading both in area and production, on average contributing about 25% of total area and 40-50% total production. Chilli is an important exportable spice of India and India exports dried forms of chilli. (Thamburaj S (2016).Textbook of Vegetables, Tubercrops and Spices.New Delhi, Indian Council of Agricultural Research,469pp).

India is the world's largest producer, consumer and exporter of chillies (*Capsicum annuum* L.) in the world. The average dry chilli yield of the country is low as compared to the progressive chilli producing countries like USA, Korea and Taiwan due to coverage of large area under low yielding genotypes (Maurya et al., 2016).

Improving productivity of chilli through developing high yielding varieties with desirable qualities could reverse the existing trend of low productivity of this crop. Since yield is a complex trait and its direct improvement is difficult, governed by a large number of component traits, knowledge of inter-character relationship is very important in plant breeding for indirect selection for characters that are not easily measured. However, under complex situation, correlation alone become insufficient to explain relationships among

characters and thus path analysis of economic yield components with yield is important. (Sreelathakumary and Rajamony, 2002; Verma et al., 2004)

Correlation: Correlation was calculated to investigate the degree of relationship between phenotypic and genotypic variances and also to test the degree of character association between parameters or traits studied.

Path coefficient analysis: Path coefficient can be defined as the ratio of standard deviation of the effect due to a given cause to the total standard deviation of the effect. The advantage of path analysis is that it provides information on the direct and indirect contribution of causal factors to the effect if the cause and effect relationship is well defined.

PROBLEM BACKGROUND

India is the largest producer of chilli, so India has vast scope to increase the production in order to promote export besides meeting its domestic requirements. Continuous efforts are made at various levels to increase productivity of chilli but it does not gain momentum.

The major problem is the low yield in chilli and to know effect of different characters and association of characters on plant yield. Yield is a very complex trait which depends upon a number of characters like plant height, no. of branches, days to flowering, days to 50% flowering, stem girth, fruit set, no. of green fruits per plant, weight of fruit, diameter of fruit, fruit length, pedicle length, no. of seeds per plant etc. After study of the association of different characters on plant yield it will become easy to select the genotype for improvement.

To plan appropriate breeding programme and evolve high yielding cultivars with resistance to pest and diseases, the plant breeder must possess adequate knowledge on character association and the extent of contribution of each character to fruit yield.

The correlation coefficient analysis measures the mutual relationship between various characters and it determines the component traits on which selection can be done for the improvement of crop.The correlation between two variables indicates only that the variables are associated it does not imply a cause and effect relationship. Path coefficient analysis will be done to identify characters having significant direct and indirect effects on fruit yield.

OBJECTIVES

1. To find the genotypic and phenotypic correlation among different genotypes of chilli.

2. To get information on the direct and indirect contribution of causal factors to the effect of chilli growth and yield in chilli.

3. To estimate association of different characters on fruit yield in chilli.

REVIEW OF LITERATURE

Usman MG (2017) et al reported that magnitude of genotypic correlation coefficients in general was higher than the phenotypic correlation coefficients for traits studied on Chilli genotypes.

Patil (2017) et al found that at both phenotypic and genotypic level, the number of fruits per plant recorded positive direct effects.

Usman (2017) et al reported that there is positive and highly significant phenotypic and genotypic associations of fruit length, fruit weight and number of fruits on pepper.

Adeferis TW (2016) et al noted that the higher genotypic correlation coefficient than the phenotypic ones, which showed the inherent associations between various characters in Ethiopian Capsicums.

Shimelis A and Bekele A (2016) et al found high positive genotypic correlation of fruit yield with the number of fruits per plant and pericarp thickness.

Rohini N and Lakshmanan V (2015) et al reported that the direct effect of number of fruits per plant and number of branches per plant on yield and, which could be considered as major yield components and selection indices for improvement.

Lakshmanan (2015) et al found positive and significant correlation of fresh fruit yield per plant with number of branches per plant, fruit length, fruit girth, individual fruit weight and number of fruits per plant.

Zhani (2015) et al observed that there is positive correlation between fruit weight and length.

Singh PK (2014) et al reported highest phenotypic correlation between fruit length and fruit girth.

Kadwey (2014) et al investigated number of fruits per plant, number of primary branches per plant had positive direct Whereas, negative direct effect was recorded by plant height on fruit yield at genotypic level and fruit width positive indirect effect on green fruit yield via number of fruits per plant.

Yatung (2014) et al illustrated seed number per fruit and fruit pericarp thickness had positive direct effect but their indirect effect was more magnified through fruit diameter

phenotypically indicating fruit diameter was important character both directly and indirectly for improvement and selection of pod yield in hot pepper.

Jogi (2013) et al reported fruit yield per plant showed highly significant and negative correlation with days to 50 percent fruit ripening means plant having late ripening produce less yield as compared to those plant which takes less days to 50 percent ripening.

Lavinia (2013) et al confirmed the existence of strong correlation between fruit weight to fruit length and diameter and also number and weight of fruits per plant.

Ullah (2011) et al reported that the number of harvest was also positively and significantly correlated with plant height, fruit length, fruit girth, individual fruit weight and number of fruits per plant. Number of fruits per plant is positively and significantly correlated with fruit length, fruit girth, pedicle length and individual fruit weight.

Kulkarni (2010) et al reported that narrow difference between GCV and PCV indicated that little environmental effect and may be governed by non-additive genes.

Suryakumari (2010) et al reported that high heritability with high GAM estimates for these traits indicated the role of additive genes in governing their expression.

Sharma (2010) et al reported that highly significant and negative correlation was obtained by 1000-seed weight with green fruit yield per plant.

Ajjappalavara (2009) et al reported that low GCV and PCV were observed for number of secondary branches, plant spread in EW and NS and stem diameter.

Kannan (2009) et al reported that among the growth parameters non-significant association of green chilli yield per plant was observed.

Patel (2009) et al reported that plant height, number of secondary branches per plant, stem girth, fruit girth and fruit length had negative direct effect on green fruit yield per plant.

Murmu D (2009) et al reported that fruit number showed negative association with fruit diameter and fruit thickness at both levels that might indicate antagonistic effects of gene actions which could not be bred simultaneously.

Sarkar (2009) et al noticed characters like seeds/fruit, fruit length and fruit width showed direct positive effect on fruit yield with low magnitudes but plant canopy width had negative direct effect on yield.

Ganeshreddy (2008) et al observed significant correlation of various yield attributing traits with fruit yield. Whereas the non-significant positive correlation was noticed for number of branches per plant, pedicle length seed weight per fruit and thousand seed weight.

Patil (2007) et al reported that high direct genotypic effect of fruit number per plant on fruit yield whereas plant spread had negative direct effect.

Bhardwaj (2007) et al reported that fruit yield per plant showed highly significant positive association with dry matter percent, average dry fruit weight, weight of seeds per plant and pericarp thickness which shows that these character are responsible for determining high yield.

Gogoi (2005) et al reported that Days to first flowering and days to 50% flowering had low GCV, PCV and GAM but high heritability.

Wasule (2004) et al reported that High estimates of GCV, PCV, heritability and GAM were observed for ascorbic acid content.

Kumar (2003) et al indicated that more fruits per plant were highly reliable component on fruit yield.

MATERIALS AND METHODOLOGY

Topic of Research:-Genetic Correlation and Path analysis in chilli (*Capsicum annum*)

Location:-Agriculture Research Farm, Lovely Professional University, Phagwara.

Year of Experiment:-2018-2019

Crop-Chilli (*Capsicum annum*)

Number of Genotypes-15

Design- Randomized block design (RBD).

Replications:- 3 replications.

Treatments:-15 treatments.

Time of Sowing:-August-September (2018)

Method of sowing- Line sowing

Spacing – 50×30 cm^2

PARAMETERS TO BE OBSERVED:-

1. Plant height (cm)
2. Days to first flowering
3. Number of green pods per plant
4. Number of primary branches
5. Number of secondary branches
6. Days to 50% flowering
7. Number of seeds per pod
8. Fruit girth (cm)
9. Fruit length (cm)
10. Capsaicin content (%)

11. Stem girth (cm)

12. Green pod weight (kg)

15. Pedicle length (cm)

16. Green pod yield/plant

17. Dry fruit length (cm)

18. Dry pod yield (g)

19. Dry pod yield per plant (kg)

20. Number of seeds per pod

Layout Of RBD:-

Replication 1	**Replication 2**	**Replication 3**
Genotype 1	Genotype 15	Genotype 8
Genotype 2	Genotype 7	Genotype 11
Genotype 3	Genotype 10	Genotype 9
Genotype 4	Genotype 14	Genotype 2
Genotype 5	Genotype 12	Genotype 15
Genotype 6	Genotype 1	Genotype 3
Genotype 7	Genotype 13	Genotype 14
Genotype 8	Genotype 4	Genotype 6
Genotype 9	Genotype 2	Genotype 7
Genotype 10	Genotype 5	Genotype 13
Genotype 11	Genotype 3	Genotype 1
Genotype 12	Genotype 6	Genotype 4
Genotype 13	Genotype 9	Genotype 5
Genotype 14	Genotype 8	Genotype 10
Genotype 15	Genotype 11	Genotype 12

EXPECTED RESEARCH OUTCOME

The trial has not started yet so definite outcome cannot be interpreted. Data will be collected on mentioned parameters. After data collection and compilation definite result will be interpreted. The research outcome will be:-

- To know the association of different characters on fruit yield of chilli and their direct or indirect effect on the yield of chilli.
- Various characters are responsible for yield of chilli like plant height, no. of branches, no. of fruits per plant, fruit length, fruit width, no. of seeds per fruit etc. each and every character have effect on the yield, it may be positive or negative.
- It will be observed which genotype is high yielding among all the genotypes.
- On the basis of their effect of different characters on the crop yield, work can be done on these particular characters to improve the crop yield.

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