INTERRELATIONSHIP OF MORPHOLOGICAL CHARACTERS IN LENTIL (*Lens culinaris* L.)

(Review)

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ABSTRACT*: Lentil (*Lens culinaris *L.) commonly known as Masoor which is an important pulse crop of Asian countries including Pakistan. It belongs to family papilionaceae. In all plant breeding program ultimate aim is to increase per unit production of the crop plants. Ultimate expression for different yield traits is seed yield in lentil. But there are some difficulties to find association of quantitative traits visually. To find correlation among quantitative traits the correlation gives the measurement of relationship between various traits associated with the production. Researcher reviewed in this paper have found strong, significant and positive phenotypic and genotypic correlations between and among yield related traits.*

INTRODUCTION

Lentil (*Lens culinaris* L.) is cultivated for its seed which is commonly called as Masoor. Lentil, among pulse crops had 2n=14 belongs to family papilionaceae. It is reported that lentil is one of the oldest crop as barley and pea [1]. To fulfill cereal base diet and protein requirement of poor man, lentils play an important role because of its richness in protein. It contains 25% protein content, 28.5% carbohydrates and 13.3% nitrogen 2].

It has food as well as medicinal values. It is a constipating tonic also used for chest diseases and for the treatment of ulcer [Gupta, 2]. In south Asia; India, Nepal, Bangladesh and Pakistan are major lentil growing countries. Its production of these south Asian countries is 0.9 million tons annually from area of 1.3 million hectares which is 36% of lentil total area in the world [FAO, 3]. In Pakistan Lentil is 2nd major pulse crop after chickpea and mainly grown in all provinces but 2/3 out of total area is in Punjab (Pakistan Bureau of Statistics, [4]. It is grown on an area of 39.0 thousand hectares as winter crops with annual production of 21.1 thousand ton its average seed yield in Pakistan is 541 kg per hectares (Federal Bureau of Statistics, [5]. The production as well as area of lentil in Pakistan is decreasing gradually due to shift of main lentil area to the other major crops and non-availability of certified seed to the former (Pakistan Bureau of Statistics, [6]. The average lentil seed yield ranges from 467-643 kg/hectare in dry area where as in irrigated area its yield is 2000 kg/hectare (Federal Bureau of Statistics, [5].

In many plant breeding programs ultimate aim is to increase per unit production of the crop plants. Ultimate expression for different yield traits is seed yield in lentil. But there are some difficulties to find association of quantitative traits visually. To find correlation among quantitative traits the correlation, gives the measurement of relationship between various traits associated with the production.

Mekonnen *et al.,* [7] found strong significant and positive phenotypic and genotypic correlation between yield related traits and also with each other. Hussain *et al.,* [8] observed highly significant variability existed in all major morphological traits/characters. They also observed remarkable difference between PCV and GCV for many traits under study. Nath *et al.,* [9] revealed that positive significant correlation between plant height, 1000 grain weight and grain yield. Tadesse *et al*., [10] found highly significant and positive association for pods per plant while for the other traits like 100 seed weight, days to maturity and final height had non-significant positive association reported. Negative association found for stand percent. Sharma *et al.,* [11] observed that seed yield was high and significantly correlated with the harvest index, number of pods per plant, plant height, number of secondary branches per plant and biological yield. Karadavut and Kavurmaci, [12] found general similarities between the species for their traits. Genetic variation phenotypic variation also observed. Many traits among them had significant genotypic effects. Sarwar *et al.,* [13] observed high heritability with genetic advance for traits like days to maturity, seed yield and biomass. Abo-Hegazy *et al.,* [14] revealed that highly significant positive correlation between seed yield per plant number of pods per plant and number of seeds plant while highly significant negative correlation was observed between seed yield, 50% flowering and days to maturity. Aghili *et al.,* [15] found highly significant correlation for grain yield, pod per plant, filled pods per plant, plant height harvest index and biological yield. Barghi *et al.,* [16] found significant correlation, they also found direct effect between number of filled pods per plant, 100 seed weight and seed yield. Kayan and Olgun, [17] found significant positive correlation between biological yield, pods seed per plant and harvest index. Tyagi and Khan, [18] found that biological yield per plant, days to 50% flowering, 100 seed weight and seed yield per plant showed wide variation and significant differences. Low difference was observed between genotypic and phenotypic coefficient of variability for all the traits. Bicer and Sarkar, [19] estimated broad sense heritability for plant height, days to flowering, pods per plant, harvest index, biological yield and yield. Heritability of plant height was quite small (16c) which shows this character depends upon the variation present in the material. Latif *et al.,* [20] revealed that plant height had highly significant and positive relationship with yield. Plant height highest effect on yield followed by pods per plant. Tyagi and Khan, [21] found positive and significant

correlation for pods per plant, harvest index and biological yield. Karadavut, [22] found the significantly positive correlation for different traits under study like harvest index, biological yield and yield. Bicer and Sarkar, [23] estimated higher heritability for the maturity, plant height, days to flowering, number of pods per plant and yield. Younis *et al.,* [24] noted significant variation for all traits. High heritability estimates was found for all the traits only number of primary branches show different results than all others. They also found higher phenotypic coefficient than genotypic coefficient. Ashraf *et al.,* [25] reported best selection index based criterion for seed yield improvement of lentil. He also found high heritability for various characters/traits with positive and significant correlation with seed yield. Rasheed *et al.,* [26] observed significant genetic variability for all the traits under study. High variability was found for all traits under study except no of primary branched showed different result. Singh *et al.,* [27] found positive significant association between pods per plant and grain yield while association between protein and methionine is non-significant positive. Bicer and Sarkar, [28] found low heritability for all the traits under study like biological yield, seed yield, days to flowering, days to maturity, pods per plant, harvest index, 100 seed weight and plant height. Anjam *et al.,* [29] founded that biomass is highly significant while pods per plant and plant height is significantly correlated with yield. Kumar *et al.,* [30] found positive correlations between 100 grain weight and seed/grain yield. Arshad *et al.,* [31] observed high and positive correlation for grain yield with plant height, pods per plant, 1000 grain weight and biological yield. Om-Vir *et al.,* [32] found significant and positive correlations between 100 grain weight and seed/grain yield. He also found positive and significant correlation for harvest index and plant height in lentil. Ali *et al.,* [33] evaluated chick pea genotypes under drought and normal condition and found 92% variability for normal condition and 96% variability for drought conditions. Rakesh *et al.,* [34] found higher GCV and PCV for seed/plant. [Sharma, 35] found higher genotypic correlation than that of phenotypic correlation. Singh *et al.,* [36] revealed that components of variance, genetic advance and heritability are helpful for breeding program to developed new varieties or to improve existing varieties. Bakhsh *et al.,* [37] gives a selection index based on primary branches, more pods and less number of secondary branches to improve yield in chickpea. Hamdi *et al.,* [38] found positive correlation for seed yield and straw yield and negative association found for protein content and seed yield. Poehlman, [39] found developmental and productive trait inheritance by estimating different genetic parameters like GCV, PCV are helpful for breeding program. Khan *et al.,* [40] also gave a selection index to improve yield in chick pea. Islam *et al.,* [41] reported high significant and positive correlation of yield per plant with number of secondary branches per plant, pods per plant and these traits were recommended as selection criteria in chickpea.

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