



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; 11(2): 1257-1258  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 09-11-2021  
Accepted: 19-01-2022

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## Correlation coefficient of different morpho-physiological parameters related to yield in coriander (*Coriandrum sativum* L.)

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### Abstract

Eight Coriander varieties viz. Rcr-20, Rcr-41, Rcr-435, Rcr-436, Rcr-446, Rcr-475, Rcr-684 and Rcr-728 were evaluated at the research farm of S.K.N. College of Agriculture, Jobner, Jaipur (Rajasthan) during Rabi, 2016 in randomized block design with three replications on loamy sand soil. Under control condition plot were irrigated at regular interval while in drought condition plots were maintained under rainfed condition. Different physiological and biochemical parameters were recorded at flowering and seed formation stages whereas yield and yield contributing parameters were recorded at maturity stages and after harvesting. The Coriander varieties Rcr-20 and Rcr-446 behaved as drought tolerance varieties maintained higher seed yield along with number of umbels per plant, seeds per umbel, test weight, seed yield, biological yield, harvest index under drought conditions. The coriander varieties Rcr-435 and Rcr-728 maintained under higher seed yield along with number of umbels per plant, seeds per umbel, test weight, seed yield, biological yield, harvest index under control conditions.

**Keywords:** Correlation coefficient, coriandrum sativum, morpho-physiological parameter and yield

### Introduction

Coriander (*Coriandrum sativum* L.) is an important seed spice crop grown in our country for its fruits as well as tender green leaves. Taxonomically it is a member of family Apiaceae, a tall herbaceous annual diploid ( $2n=22$ ). It is highly cross-pollinated crop believed to be native of Mediterranean region. In India an area of coriander was estimated to be 6,22,000 ha with an annual production of 5,66,000 MT (Anonymous, 2015-2016) [1, 2]. In Rajasthan it is mainly grown in the district of Baran, Kota, Bundi, Chittorgarh and Jhalawar with an area of 212725 ha and annual production of 227203 tones (Anonymous, 2015-2016) [1, 2]. Coriander variety RCr-41 is an important variety of Rajasthan covering large area and is recommended for normal sowing time. However, the early growth of variety is very slow and the maturity generally coincides with high temperature. Similarly, varieties like RCr-436 and RCr-684 are also suitable for normal conditions and also cover a large area of state. Water stress severely reduces yields of field crops grown under rainfed conditions (Jangpromma *et al.* 2010a) [6]. Drought is the major cause of yield reduction in crop plants, since it is a major limiting factor for plant growth and development particularly in arid and semiarid regions. It is well known that drought stress brings about numerous metabolic, biochemical and physiological changes in plant traits like growth (Ashraf and Iram, 2005; Benjamin and Nielsen, 2006) [7, 10], water status, membrane stability (Bai *et al.*, 2006) [8], pigment content and photosynthetic activity (Ekmekc *et al.*, 2005) [9].

### Materials and Methods

The study was conducted using eight genotypes (Two drought tolerant and Six drought susceptible) in randomized block design with three replications. The eight varieties of *Coriandrum sativum* namely Rcr-20, Rcr-446 (Drought tolerant) and Rcr-41, Rcr-435, Rcr-436, Rcr-475, Rcr-684 and Rcr-728 (Drought susceptible) were grown in field. In field the varieties were grown in randomized block design with control and drought conditions. Under control condition the plants were irrigated at flowering and seed formation stage while in drought the plants were maintained under rainfed condition. Observation on 50 Per Cent flowering was taken when half of the plants in a plot flowered. Plant height, number of umbel per plant and seeds per umbel, umbellets per umbel were measured at time of harvesting,

whereas, test weight, seed yield, harvest index, biological yield, and drought susceptibility index were measured after harvesting and threshing of the crop.

### Result and Discussion

A significantly positive correlation that most of the morpho physiological parameters have positive and significant correlation with grain yield of coriander both at flowering and seed formation stages. Further the correlation coefficient of yield attributes with seed yield of Coriander show a positive and significant correlation with most of the characters except total chlorophyll content and days to 50 per cent flowering. Thus, these traits were important for a variety to sustain yield under the stress. Yield is the most important parameters for a crop. However, the yield contributing parameters are different in cereals, seed spices and pulses. In case of Coriander we have measured the plant height, day to flowering, number of umbels per plant, number of seeds per umbel, umbellets per umbel, test weight, seed yield, biological yield, harvest index in eight Coriander varieties.

The varieties varied significantly for days to 50 per cent flowering under stress and the mean reduction was 11.83 per cent. This reduction indicate that drought condition caused some metabolic changes in the Coriander plants conversion from vegetative phase to reproductive phase. Water stress decreased number of pods per plant at 50 per cent flowering stage in chickpea (Hamid *et al.* 1990) [3]. Water stress induced reduction in growth parameters was also reflected in number of seeds per pod, number of pods per plant and seed index. Plant height varied significantly among the varieties under control as well as drought conditions. The mean reduction under drought condition was 12.67 per cent. Singh and Choudhary (2003) [5] reported that mean performance of genotypes for plant height was comparatively low under stress condition and reported 15.7 per cent reduction due to stress for plant height.

Result on seed yield indicated that Rcr-446 exhibited maximum yield under control condition which was closely followed by Rcr-20 and Rcr-435. In contrast Rcr-446 exhibited maximum yield under drought condition which was closely followed by Rcr-728 and Rcr-41. These variation in yield were found attribute to the variations in yield contributing parameters vis-a-vis existence of drought tolerance mechanism at cellular and molecular level. In present investigation the highest yield of Rcr-446 under drought condition might be on account of better performance of this variety to yield contributing parameters like umbels per plant, seeds per umbel, umbellets per umbel, test weight, biological yield and harvest index. These parameters have been found positively correlated with seed yield indicating their influence on determination of yield. Water stress caused decrease in biological yield as compared to non stress condition. Biological yield is an important criterion for improvement in yield, which is strongly influenced by the environment (Kumar *et al.* 2001) [4]. In case of harvest index as an important criterion for improvement in the yield, this is strongly influenced by environment. The correlation analysis indicated that most of the yield attributes with seed yield of Coriander show a positive and significant correlation with most of the parameters except days to 50 per cent flowering. Further the correlation coefficients of physiological parameters have positive and significant correlation with seed yield of Coriander both at flowering and seed formation stage.

**Table 1:** Simple correlation coefficient of yield attributes and yield parameters with seed yield of coriander (n=8)

Parameters	Correlation coefficient (r)
<b>Yield v/s</b>	
Plant height	0.547*
Days to 50% flowering	0.432
Number of umblesper plant	0.671**
Umbelets/umbel	0.866**
Number of seeds per umbles	0.904**
Test weight	0.032
Harvest index	0.918**
Biological yield	0.494

\*indicates significance at 5% levels

\*\*indicates significance at 1% levels

**Table 2:** Simple correlation coefficient of physiological parameters with seed yield of coriander (n=8)

Parameters	Correlation coefficient (r)	
	Flowering	Seed formation
<b>Yield v/s</b>		
Relative water content	0.598*	0.458
Total chlorophyll content	0.394	0.432
Carotenoids	0.338	0.276
MSI	0.602*	0.240
Proline	-0.449	-0.507*

\*\*Indicates significance at 1% levels

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