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Variation of yield components in coriander (Coriandrum Sativum L.)

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Abstract. The aim of the present study was to generate information on variation of some important yield components in a coriander collection. The study was conducted in the Institute of Agriculture - Karnobat, during the period 2008-2010 and included 81 coriander accessions. The experiment was laid out in a randomised complete block design with three replications. Ten plants were randomly selected from each plot and data were collected for plant height, number of branches per plant, number of umbels per plant, number of fruits per umbel, fruit weight per umbel, 1000-fruits weight and fruit weight per plant. A large variation was observed for most of the studied traits. Suitable accessions for future use in coriander breeding program were identified.

Keywords: coriander, yield components, variation

Introduction

Coriander (Coriandrum sativum L.) is an annual spice herb that belongs to the family of Umbelliferae/Apiciaceae. It is used as a spice in culinary, medicine and in perfumery, food, beverage, and pharmaceuticals industries (Diederichsen, 1996; Jansen, 1981). Although coriander has got diverse uses the knowledge on the extent and magnitude of genetic variability of agronomic and quality traits is limited. The existence of sufficient level of genetic variability is a prerequisite for variety development and therefore detailed evaluation of the accessions for different morphological, agronomic and quality traits is necessary in order to identify accessions with useful traits for improvement programs.

This study was designed to assess the variation that exists in coriander accessions for some important yield components.

Material and methods

The study was conducted in the Institute of Agriculture, Karnobat, during the period 2008–2010 and included 81 coriander accessions. The experiment was laid out in a randomized complete block design with three replications. Spacing between plants and rows were kept as 15 and 30 cm, respectively. At maturity ten plants were randomly selected from each plot and data were collected for plant height, number of branches per plant, number of umbels per plant, number of fruits per umbel, fruit weight per umbel, 1000-fruits weight and fruit weight per plant.

Accession means were used to calculate the mean, minimum, maximum, range and coefficient of variation (CV) for each trait. For analysis of stability of studied traits in different years of testing GGE biplots were used. The GGE biplots were computed in GenStat (Payne et al., 2007).

Results and discussion

A large variation was observed for most of the characters studied in germplasm accessions (Table 1). Plant height ranged from 48.67 to 101.67 cm and was the lowest variatied trait with a CV 13.77 per cent. The mean number of branches per plant was 7.81 and varied from 5 to 12 branches in different accessions. Number of umbel per a plant ranged from 11.00 to 40.67 and CV was 30.30 per cent. Number of fruits per umbel varied from 17.00 to 58.00 and with a CV of 24.04 per cent. Coriander accessions showed wide variation in fruit weight per a umbrel ranged from 0.06 g to 0.51 g and CV was 43.17 per cent. 1000-fruits weight also showed wide range of 3.52 g to 13.13 g with a CV of 34.85. The means observed in this

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Even though plant height may not be considered strictly as a "yield component," there is data in literature that plant height was tightly associated with plant yield and with all yield determinants (Diederichsen, 1996; El-Ballal and Abou El-Nasr, 1987). Contrariwise, reducing plant height allows producers to seed at higher rates, makes cultivation practices easier, and strengthens stems, preventing lodging. Therefore, suitable for breeding purpose were accessions 25, 48, 55, 56, 58 with plant height about 70–80 cm and most stable for this trait (Figure 1). In contrast, the 33, 57, 6, 27 were the least stable accessions for plant height.

The biplot for number of branches per plant (Figure 2) indicates that the 41, 44, 4, 10 are the accessions with the highest average number of branches per plant and relatively good stability. Accessions 38, 72, 71, 54, 60 have stable and high number of umbels per plant (Figure 3). Accessions 67, 61, 10, 79 also have high number of umbels per plant but low stability in different environments.

Traits number of branches per plant and branches per plant in coriander breeding are in particular interest in coriander breeding because correlation and path coefficient analysis indicated that this traits were ones of the most important traits as they exerted positive direct effect on seed yield (Singh et al., 2006). High mean values with stable performance for fruit number per umbel (Figure 4) had accessions – 37, 80, 63 and for fruit weight per umbel (Figure 5) accessions – 31, 48, 37, 12 can be select.
The results from this study showed that some genotypes were stable for some traits and unstable for another, suggesting that the genetic factors involved in the G x E differed between yield-related traits. The data presented in the present study had shown the presence of substantial variability in coriander accessions. Hence, the possibility for further improvement through selection using these variations is wide.

Accessions 31, 25, 38, 72, 71, 54, 60 were identified as suitable for future use in coriander breeding program for the production of high yielding coriander varieties.
Conclusion

A large variation was observed for most of the characters studied in germplasm accessions. High coefficients of variation (CVs) were recorded in fruit weight per umbel and per plant and 1000-fruits weight. Accessions 31, 25, 38, 72, 71, 54, 60 could be used successfully as progenitors in breeding programme for the production of high yielding coriander varieties for conditions of Bulgaria.

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