Current and prospective strategies in the varietal improvement of Chilli (Capsicum annuum L.) specially Heterosis breeding

Chilli (Capsicum annuum L.) is an herbaceous crop and plays an important role as common spices and vegetables. Pepper (Capsicum spp.) is one of the most cost-effective and agricultural vegetables in the world. The most significant characteristics of peppers, as spices and in various pharmacological uses, are pungency and oleoresin (color). Cabsicum annuum L. is widely used as a medicinal herb and in the Mediterranean diet (at the present, C. annuum var. acuminatum Fingerh. and Capsicum frutescens L. are considered synonyms of C. annuum L.). Capsicum annuum includes a wide range of carotenoids including capsanthin, capsorubin, beta-carotene, cryptoxanthin, lutein, fanthophyl, and xanthophyll, and capsaicinoid. However, it remains limited in production due to the lack of development in varieties especially under severe climatic circumstances such as drought, high temperature, or salt. Some reports were provided through distinct traditional approaches for genetic improvement. A combination of traditional and molecular breeding, especially breeding for heterosis, might be a good option for developing a novel genotype for ecologically adversely affected niche adaption. This review summarizes the current chilli breeding approaches with their drawbacks and highlights some recent classical efforts for the improvement of the crop. This would be the milestone for the breeders in the planning of a successful chilli breeding program to combat the adverse ecological condition. Thus, the information gathered in this article might be considered as the cornerstone of Chilli breeders at their ongoing and sustainable future programs as well.

Keyword: Capsicum annuum L.; Varietal improvement; Heterosis; Breeding techniques