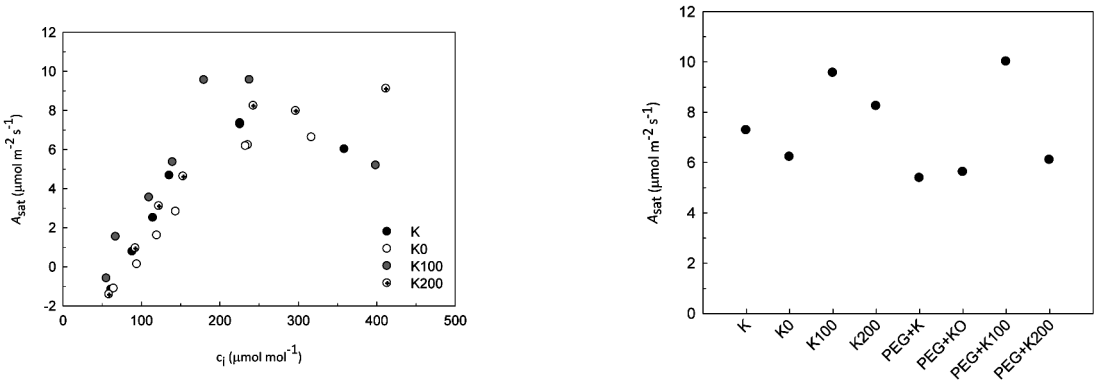

REFERENCES

1. *Ashraf, J.* Differences in Returns to Education: *An Analysis by Race* / J. Ashraf // American Journal of Economics and Sociology. – 1994. – V. 53 (3). – P. 281–290.

2. *Boyer, J. S.* Plant Productivity an Environment / J. S. Boyer // Science. – 1982. – № 218. – P. 443–448.

3. *Hongbo, S.* Changes of anti-oxidative enzymes and MDA content under soil water deficits among 10 wheat (*Triticum aestivum L.*) genotypes at maturation stage / S. Hongbo, L. ZongSuo, S. MingAn // Colloid. Surface. B. – 2005. – № 45. – P. 7–13.

4. *Kalefetoğlu, T.* The effects of drought on plants and tolerance mechanisms / T. Kalefetoğlu, Y. Ekmekçi // Gazi University Journal of Science. – 2010. –№ 18 (4). – P. 723–740.

5. *Kuşvuran, Ş.* Changes occur in lipid peroxidation, chlorophyll and ion contents of some salt tolerant and sensitive Cucumis sp. genotypes grown under salinity stress / Ş. Kuşvuran, F. Yaşar, K. Abak, Ş. Ellialtıoğlu // Yüzüncü Yıl University, Journal of Science. – 2008. – № 18 (1). – P. 11–18.

6. *Lawlor, D. W.* Photosynthetic carbon assimilation and associated metabolism in relation to water deficits in higher plants / D. W. Lawlor, G. Cornic // Plant Cell and Environ. – 2002. – № 25 (2). – P. 275–294.

ОЦЕНКА ГЕНЕТИЧЕСКОГО РАЗНООБРАЗИЯ ПОПУЛЯЦИИ ДИКОРАСТУЩЕГО НУТА, СВЯЗАННОЙ С НЕПРЕРЫВНЫМ ИЗМЕНЕНИЕМ ОКРУЖАЮЩЕЙ СРЕДЫ

GENETIC DIVERSITY ASSESSMENT OF A COLLECTION OF WILD CHICKPEA POPULATIONS AIMING TOWARDS CONTINUOUSLY CHANGING ENVIRONMENT

Abdullah Kahraman[1]*, Anamika Pandey[2], Mohd. Kamran Khan[2], Ahmet Cakmak[1], Bilal Aydin[1], Jens Berger[3], Mahmut Gayberi[4]

[1]Harran University, Faculty of Agriculture, Department of Field Crops, Sanliurfa, Turkey
[2]Selcuk University, Faculty of Agriculture, Department of Soil Science and Plant Nutrition, Turkey
[3]CSIRO Plant Industry, Wembley, WA 6913, Australia
[4]GAP Agriculture Research Institute (GAPTAEM), Turkey
kahraman@harran.edu.tr

Climate change is one of the most challenging issues that has motivated the scientific community to utilize wild genetic resources. Wild species provide a rich source of potential traits to breed into cultivated varieties, including biotic and abiotic stress tolerance. Hence, we collected the morpho-genetic variation data of newly collected approximately 502 wild chickpea accessions belonging to 31 distinct populations. Here, we present the variation in days to flowering, days to maturity and seed weight per plant of the collected wild germplasm grown in plastic house conditions. Statistical analysis revealed significant variation among the collected wild populations. Variability in the studied traits suggests the potential exploitation of these wild germplasm resources in future breeding programs for the genetic improvement of cultivated varieties.

Изменение климата является одной из наиболее сложных проблем, которые побуждают научное сообщество использовать дикие генетические ресурсы. Дикие виды обеспечивают бо-гатый источник потенциальных признаков для разведения в культивируемые сорта, включая биотическую и абиотическую устойчивость к стрессам. Таким образом, мы собрали данные морфо-генетических вариаций вновь собранных примерно 502 проб дикорастущего нута, при-надлежащих 31 различным популяциям. Здесь мы приводим вариацию в днях к цветению, дням к зрелости и весу семян на растение собранной дикой зародышевой

плазмы, выращенной в пластиковых домашних условиях. Статистический анализ показал значительные различия среди собранных диких популяций. Изменчивость в изученных чертах свидетельствует о возможной эксплуатации этих диких ресурсов гермоплазмы в будущих селекционных программах для генетического улучшения культивируемых сортов.

Keywords: crop improvement, domestication, crop yield loss, food security, sustainable agriculture.

Ключевые слова: улучшение сельскохозяйственных культур, приручение, снижение уро-жайности культур, продовольственная безопасность, устойчивое сельское хозяйство.

Climate change is one of the serious problems that world has to face in the coming decades. It has a negative impact on agricultural yields all over the world. Moreover, strong reduction in genetic diversity of crops caused by several bottlenecks (Abbo et al., 2003) poses a threat to their adaptation towards these environmental changes. In such scenario, utilization of wild genetic resources can be an effective approach to facilitate the crop improvement programs towards climate changes and may warrant global food security.

Chickpea is the third most significant legume crop produced in the world, with Turkey as one of the major producers and providing ample amount of proteins and vital amino acids to human body (Jukanti et al. 2012; Verma et al., 2015; FAO STAT 2015). It is considered to have been domesticated from its wild progenitor, *Cicer reticulatum* around 11,000 years ago in central Fertile Crescent that presently belongs to South Eastern part of Turkey and Syria (Zohary and Hopf, 2000).

In this experiment, during the year 2013 and 2014, we have newly collected approximately 502 wild chickpea accessions belonging to 31 distinct populations and planted them under plastic house conditions. These accessions were assessed for different agro-morphological traits. In this study, we provide the disparity obtained in different morphological characters including days to flowering, days to maturity and seed weight per plant of each collected germplasm.

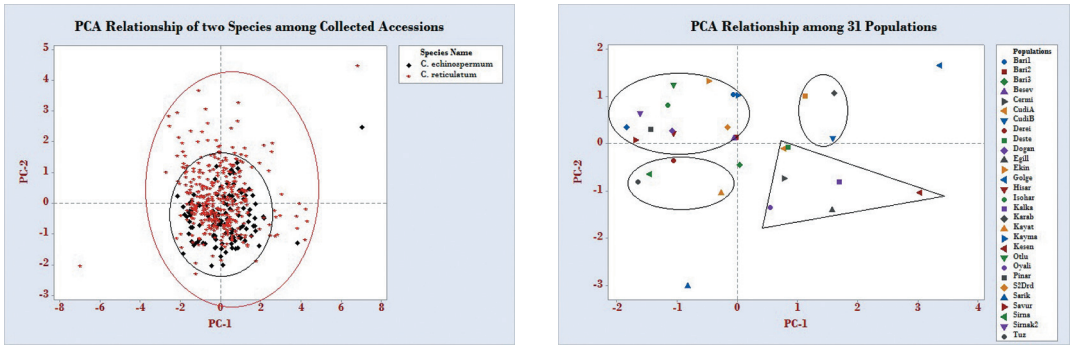

Figure 1 – PCA Scatterplot showing Relationship among different Species and Populations

Analyzed results showed significant variation among the collected populations and species (Figure 1). In principal component analysis, first two components explained 96 % of the morphological variation. Phylogenetic analysis based on three traits revealed two main groups and four sub-groups amongst 31 populations. Coefficient of variation for days to flowering, days to maturity and seed weight per plant was in the range of 1,1–7,7, 0,9–29,3 and 13,8–60,2, respectively. Variations obtained in the studied characters emphasize on the effective deployment of experimental wild germplasm resources in different breeding programs aiming climate changes in the environment. Association of these traits with molecular markers can be of much significance for further genetic studies.

BIBLIOGRAPHY

1. *Abbo, S.,* et al., 2003. The chickpea, summer cropping, and a new model for pulse domestication in the ancient near east. Q. Rev. Biol. 78, 435e448.

2. *Zohary, D., Hopf, M*., 2000. Domestication of plants in the old world, third ed. Clarendon Press, Oxford, UK.

3. *Verma, M., Kumar, V., Patel, R. K., Garg, R.* and *Jain, M.* (2015). CTDB: An Integrated Chickpea Transcriptome Database for Functional and Applied Genomics. PLoS ONE, 10 (8): e0136880. doi:10.1371/journal.pone.0136880.

4. FAO (2015) Food and Agricultural Organization of the United Nation, FAO Statistical Database. (http://faostat3.fao.org/home/E).