Abstract

The interaction of genotype × environment for researchers in the field of plant breeding has particular importance and awareness of it, helps the breesders to evaluate genotypes more carefully. Success in selecting cultivars and lines by favorable yield is strongly influenced by the genotype × environment interaction. In this research, in order to investigate the interaction between genotype × environment, 11 advanced rice lines from the 12th generation were selected and produced through Pedigree method, along with four varieties of Sang-tarom and Dilmani (local varieties) and Neda and Sepidrood (developed varieties) for assessing the stability and adaptability of grain yield using randomized complete block designs with three replications were evaluated in three regions of Mazandaran province (Sari, Amol and Tankabon) during two years (1395 and 1396). in present research, quantitative traits such as days to 50% flowering, days to maturity, plant height, number of fertile tillers, spike length, number of filled seeds per spike, 1000 seeds weight, grain length and grain width, grain yield, seed physico-chemical traits including gelatinization temperature, amylose percentage, gel concentration and cooking rate of elongation. Also, the gelatinization temperature, amount of amylose, gel concentration were evaluated using microsatellite markers (SSR). The results of analysis of variance and combined analysis indicated that there were significant genetic differences between the studied genotypes. Considering the significance of genotype × location interactions for grain yield in combined analysis. In order to precise study of interaction and determining of genotypes for yield stability, the stability analyses were performed using an number of univariate and multivariate statistics. According to the results, genotype No. 48 with an average yield of 6.65 ($t.ha^{-1}$) showed the highest stability. In addition, the AMMI model and graphical analysis using GGE-biplot were used for accurate interpretation. The study indicated that the two principle components of these two models had expressed more than 91% of grain yield differences. Stable genotypes 48, 5, genotypes and Neda and Sepidrood cultivars produced the highest yield in all environments with 6.65, 6.98, 7.72 and 7.37 t.ha-1 respectively. For better understanding and measuring the relationship and similarity of genotypes, the Spearman rank correlations was used. Therefore, selection of stable genotypes using these statistics may result in identifying the yielding genotypes. Results showed coefficient of regression, Pintoos index, Plestid paird varians, Tanrazou's second and third statistic had a positive and high correlation with mean yield, it was indicative that selecting of stable genotypes based on these statistics, is caused high-yield genotypes to introduce.. In current research, genotype No. 48 was introduced to most stable genotype, containing favorable caractrestic phenology, spike length, grain size, and number of grains filled in spike. In addition, this genotype had suitable quality in gel consistency, amylose content, grain aroma and grain shape.

Key words: Rice developed lines, stability analysis, and single and multivariate stability statistics.

University of Zabol

Faculty of Agriculture

Department of plant breeding and biotechnology

Thesis for the Degree of Ph.D in Plant Breeding

Investigation of adaptability and yield stability of promising lines of rice in Mazandaran province

Supervisors

M. Solouki (Ph.D.)

N. A. Bagheri (Ph.D.)

Advisors

B. A. Fakheri (Ph.D.)

A. R. Nabipour (Ph.D.)

By

A. Sattari

Summer 2018