

Evaluation of quantitative and qualitative traits and resistance to powdery mildew pathogen in populations of sainfoin plant (*Onobrychis vicifolia*)

M. A. alizadeh^{1*}, M. R. Moeini², A. Ashraf Jafari³, M. kamel⁴

1. Corresponding author, Associated Professor, Natural Resources of Gene Bank Group, Research Institute of Forests and Rangelands, Agricultural Research Education and extension Organization (AREEO), Tehran, Iran. (Corresponding author)
2. High expert of weed science, Department of Plant Protection, Zanzan agriculture and natural recourse and education center, Agricultural Research Education and extension Organization (AREEO), Tehran, Iran.
3. Professor, Rangelands Research Division, Research Institute of Forests and Rangelands, Agricultural Research Education and extension Organization (AREEO), Tehran, Iran.
4. High Experts of bean breeding, Director of Department, Zanzan agriculture and natural recourse and education center, Agricultural Research Education and extension Organization (AREEO), Tehran, Iran.

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Extended Abstract

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Introduction: Powdery mildew is an important disease in the major crop growing areas of Iran. It is mainly caused by the fungal pathogen *Leveillula taurica* in the asexual form of *Oidiopsis taurica*. This fungi is capable of infecting over 700 plant species belonging to 59 families including pepper, tomato, alfalfa and cotton (Correll *et al.*, 1987). The symptoms of this disease consist of the appearance of necrotic spots with white mucous membrane covering leaves, plant growth retardation, falling of infected leaves, the formation of wrinkled tiny seeds, which consequently results in the reduced crop yield (Sharifnabi and Banihashemi, 1990). The disease has been detected in different growing areas of sainfoin in Zanzan province.

Material and Methods: In this research, the seeds of 17 populations of Sainfoin were sown using randomize block design with thee replications at the experimental field of Khirabad station affiliated with agricultural and natural resources research and education center of Zanzan province from 2014 to 2016. The quantitative traits evaluated for three cutting schedules over the three years included: fresh and dry forage weight, medium infection percentage and disease

Email address of the corresponding author: Alizadeh202003@gmail.com

severity index (DSI) of the populations. The qualitative traits investigated in the study included: crude protein (CP), dry material digestibility (DMD), water soluble carbohydrate (WSC), insoluble fiber in acid detergents (ADF), insoluble fiber in neutral detergents (NDF), ash content (ASH) and crude fiber (CF).

Result and Discussion: The mean comparison for results of the first year of the experiment showed that fresh weight for the populations of 15364 (7467 kg ha⁻¹), 1601 (6298 kg ha⁻¹), polycross (6286 kg ha⁻¹), 2399 (6231 kg ha⁻¹) was higher than the other populations. In the second year, the populations of 9263, 15364, Osnavia and Polycross produced fresh weights of 1904, 1516, 15024 and 14455 kg ha⁻¹ respectively. In the third year, the populations of 9263, 3800, 1601 and 15353 had the highest forage fresh weights of (8938, 8569, 6186 and 6024 kg ha⁻¹), respectively. The results of the first year showed that forage dry weight of the populations 15364 (1816 kg ha⁻¹), 1601 (1575 kg ha⁻¹), 2399 (1569 kg ha⁻¹), and 9263 (1507 kg ha⁻¹) were higher than the other populations. In the second year, the forage dry weights of the populations 9263, 15364, 1601 and Oshnavieh were 7030, 6674, 5937 and 5203 kg ha⁻¹, respectively which were higher than the other populations. The populations of 9263, 3800, 8199 and 1601 had the highest forage dry weight of 2640, 2567.6, 1647.3 and 1630.8 kg ha⁻¹, in the third year compared to the other populations. Two populations of 15364 and 1601 with average fresh forage yields (9240 and 8608 kg ha⁻¹) and dry forage yields (3048 and 3057 kg ha⁻¹) produced higher yield as compared to the other populations. Three populations of 3001, 15353 and Oshnavieh were tolerant to powdery mildew disease due to low disease severity index and had high quality forage due to high dry material digestibility. These results are in conformity with those of Alizadeh *et al.*, (2012) who concluded that three populations of 3001, 15353 and Oshnavieh were tolerant to powdery mildew disease due to low disease severity index. The dendrogram of cluster analysis and principal component analysis (PCA) identified three populations of 3001, 15353 and Oshnavieh, as superior than other populations for their tolerance to powdery mildew disease.

Conclusion: Based on the results of the study, it was concluded that some populations such as 3001, 15353 and Oshnavieh, were superior than the other populations because of their tolerance to powdery mildew disease and medium forage production. These three populations had high quality forage due to high dry material digestibility.

Keywords: Sainfoin, powdery mildew, *Leveillula taurica*, tolerance, yield and forage quality

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