

DOWNY MILDEWS SPECIES ON THE WEEDS OF LENTIL FIELDS IN DIYARBAKIR IN TURKEY

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Abstract

The study was carried out to determine downy mildews species on the weed, which create problems on lentil fields of Diyarbakir province of Southeastern Anatolia Region of Turkey during 2013. As result of this study, 7 different downy mildews were detected on 7 different weed species in the lentil fields. These downy mildews species are following: *Peronospora aparines* (de Bary) Gäum., *Peronospora arborescens* (Berk.) De Bary, *Peronospora lamii* A. Praum., *Peronospora narbonensis* Gäum., *Hyaloperonospora parasitica* (Pers.) Constant., *Peronospora sisymbrii-officinalis* Gäum. and *Peronospora trifoliorum* de Bary were determined on the weeds *Galium aparine* L., *Papaver macrostomum* Boiss & Huet. ex Boiss, *Lamium amplexicaule* L., *Vicia narbonensis* L., *Myagrurn perfoliatum* L., *Sisymbrium officinale* (L.) Scop. ve *Trifolium* sp. respectively.

Key words: downy mildews, weed, lentil field, Diyarbakir, Turkey.

INTRODUCTION

Lentil (*Lens culinaris* Medik.) is very low in saturated fat, cholesterol and sodium. It is also a good source of thiamin, iron, phosphorus and copper, and a very good source of vitamin C, folate and manganese. Lentil has a large dosage of folate (folic acid), which fights heart disease and prevents birth defects. Lentil contains 75 % carbs, 21 % protein and 4 % fats (Anonymous, 2016).

Lentil, occupying an important position in the human diet, is consumed in different forms. In India, lentil is consumed either in boiled form (locally known as dal) or in the bread (roti) made from either wheat or maize flour mixed with lentil. Another food name "Khichri" is also made from lentil (Williams et al., 1993; Coskuner and Karababa, 1998). It is generally consumed as soup in Turkey. Lentil soup is very popular because of its taste, nutritional value and high protein content. Moreover, quenelles, ready soups and flour are also made from lentil in the country (Coskuner and Karababa, 1998).

Turkey ranked 3rd in lentil production in the world after Canada and India (Anonymous, 2010). A huger portion of annual lentil production in the country comes from South Eastern Anatolia region where, only red lentil

is cultivated. In the recent decades, possibilities of irrigation have been raised in the region and lentil cultivation has been shifted to irrigated agriculture. The shift in production practices, climatic factors, and weeds have been thought as the hurdles in sustainable production of lentil in the region.

Weeds compete with lentil plants for water, nutrients and aeration; impair growth and development of lentil, offer difficulties in harvesting and decrease the quality of produce through weed seed contamination. Additionally, weeds also serve as alternative hosts for a number of diseases thus negatively affect the lentil production.

The use of biological control agents for weed control has attracted increased attention recently. The diagnosis of host weeds and their natural enemies is the foundation stone of a successful biological control program.

Studies of phytopathogenic fungi and other microorganisms on weeds of agrophytocoenosis are important in terms of biological control of them. There are some reports in Turkey that interested with fungal plant pathogens on weeds (Göbelez, 1963, 1964; Erciş and İren, 1993; Uygur et al., 1993; Özrenk and Tepe, 1999; Bahçecioğlu and Gjaerum, 2003; Kavak, 2003; Sert and Sümbül, 2003; Kirbağ, 2004; Sert, 2009; Tunalı et al.,

2009; Erdoğan et al., 2010; Öztaş, 2011; Ekici et al., 2012; Öztaş et al., 2013, 2015; Erdoğan and Hüseyin, 2013). However, new pathogen records are to be determined in the future, which will contribute to the biological control of weeds.

In this study downy mildew fungi infesting the weeds prevailing in lentil crop were identified.

MATERIALS AND METHODS

Specimens of the downy mildews were collected during periodical mycological excursions in lentil fields in Diyarbakır Province of Turkey, in 2013. Microscopic studies were carried out on slides prepared in distilled water. Microphotographs were captured by Olympus BX 53 research microscope supplied with Olympus DP 22 digi-CAM (Japan) and Axio imager 2 equipped with Nomarski differential interference contrast optics. The fungi were identified using the handbooks and other publications (Ellis and Ellis, 1987; Mayor, 1962; Sacc., Syll. 1881-1931; Uljanishchev 1985; Vanev et al., 1993). The host plants were identified using the "Flora of Turkey and East Aegean Islands" (Davis, 1965–1985). Taxa, families, and author citations are spelled according to Kirk and Ansell (1992), and Index Fungorum (2016). All specimens are deposited in the Mycological Collection of the Dicle University, Diyarbakır (Faculty of Agriculture, Department of Plant Protection).

RESULTS AND DISCUSSIONS

The list of downy mildews with their host plant, collection sites, coordinates, altitudes, dates and the numbers of the collector (CÖ = Cumali Öztaş) is presented below.

OOMYCOTA

Peronosporales

Peronosporaceae

1. *Peronospora aparines* (de Bary) Gäum.

Specimen examined: – In lentil field, on the living leaves of *Galium aparine* L. (*Rubiaceae*), TURKEY, Diyarbakır Province, Sur District, 37°53'24" N, 40°16'28" E, 668 m, 3 April 2012, CÖ 201211.

2. *Peronospora arborescens* (Berk.) De Bary

Specimen examined: – In lentil field, on the living leaves of *Papaver macrostomum* Boiss & Huet. ex Boiss (*Papaveraceae*), TURKEY, Diyarbakır Province, Silvan District, 38°08'24" N, 40°55'18" E, 806 m, 16 April 2012, CÖ 201212.

3. *Peronospora lamii* A. Praum.

Specimen examined: – In lentil field, on the living leaves of *Lamium amplexicaule* L. (*Lamiaceae*), TURKEY, Diyarbakır Province, Bismil District, 37°46'50" N, 40°45'49" E, 568 m, 18 September 2014, CÖ 201213.

4. *Peronospora narbonensis* Gäum.

Specimen examined: – In lentil field, on the living leaves of *Vicia narbonensis* L. (*Fabaceae*), TURKEY, Diyarbakır Province, Silvan District, 38°08'24" N, 40°55'18" E, 806 m, 16 April 2012, CÖ 201214.

5. *Hyaloperonospora parasitica* (Pers.) Constant.

Specimen examined: – In lentil field, on the living leaves of *Myragrum perfoliatum* L. (*Brassicaceae*), TURKEY, Diyarbakır Province, Ergani District, 37°53'09" N, 39°42'34" E, 1033m, 24 April 2012, CÖ 201215.

6. *Peronospora sisymbrii-officinalis* Gäum.

Specimen examined: – In lentil field, on the living leaves of *Sisymbrium officinale* (L.) Scop. (*Brassicaceae*), TURKEY, Diyarbakır Province, Çınar District, 37°48'24" N, 40°21'17" E, 623 m, 25 April 2012, CÖ 201216.

7. *Peronospora trifoliorum* de Bary

Specimen examined: – In lentil field, on the living leaves of *Trifolium* sp. (*Fabaceae*), TURKEY, Diyarbakır Province, Sur District, 37°53'24" N, 40°16'28" E, 668 m, 9 April 2012, CÖ 201217.

CONCLUSIONS

Weeds negatively affect the field crops in several ways such as; increase input costs, serve as alternative hosts for many casual agents of several diseases, offer hurdles in harvesting, decrease production and lower the quality of produce (Özer et al., 2001).

Lentil occupies first position in the legumes' production of South Eastern Anatolia region. Seven different mildew fungi were identified on seven different weeds in this study

conducted in lentil crop. The incidences of the identified fungi varied according to the vegetation period. Moreover, less frequency of the fungi were observed in the crops where weeds were managed through crop rotation and thin plantation. Whereas, the incidence of the fungi were severe in the fields where these practices were not opted.

In conclusion, the fungi observed on the weeds prevailing in lentil fields have been considered important. Moreover, the diagnosis of fungi will contribute in the future biological control programs for weed management. The increase in weed infestation due to the possibilities of irrigation is expected in South Eastern Anatolia region.

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