Diseases Caused by Parasitic Plants

First Report of *Orobanche laxissima* Parasitizing Pomegranate (*Punica granatum*) in Georgia

R. Piwowarczyk,^{1,†} K. Ruraż,¹ G. Góralski,² D. Kwolek,² M. Denysenko-Bennett,² and N. Staszecka-Moskal²

¹Center for Research and Conservation of Biodiversity, Department of Environmental Biology, Institute of Biology, Jan Kochanowski University, 25-406 Kielce, Poland

²Institute of Botany, Faculty of Biology, Jagiellonian University, 30-387 Kraków, Poland

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Orobanche laxissima Uhlich & Rätzel (Orobanchaceae) is a polyphagous root parasitic weed distributed in the Caucasus Mountains and Transcaucasia, especially Russia, Georgia, Armenia, Azerbaijan, and northeast Turkey (Piwowarczyk et al. 2019). It infects many wild or sometimes cultivated trees and shrubs, such as Betulaceae, Oleaceae, Fagaceae, Aceraceae, Cornaceae, usually *Fraxinus* L., *Fagus* L., and *Carpinus* L. (Piwowarczyk et al. 2019, 2020). *Punica granatum* L. (Lythraceae), commonly known as pomegranate, is native to the Caucasus and to the Himalayas in northern Pakistan and northern India and is widely cultivated (e.g., in the United States and throughout the Mediterranean). Pomegranate is one of the first domesticated fruits and has been used in folk medicine or as a food for centuries. Fruit, seed, leaf, flower, root, and bark extracts have extensive medicinal properties (Shaygannia et al. 2016). Field surveys conducted in southeastern Georgia in May 2019 revealed extensive infestations of *O. laxissima* on the roots of *P. granatum* in one locality in Kakheti Province, near Signaghi (41°37.4 N, 45°56.3 E, 480 m elevation), in roadside or hill scrub and cultivated areas of pomegranate. The infection was confirmed by verifying the attachment of the *Orobanche* to the *Punica* root. The population of the parasite consisted of at least ~1,000 shoots; sometimes in one clump was ~100 individuals. A single

plant of pomegranate was parasitized by few to ~100 broomrape plants, and 10 to 20% of the ~1-ha location was infested. The main botanical features of the *O. laxissima* are as follows: (i) stem simple, (10 to) 25 to 40 (to 100) cm high, with haustoria; (ii) inflorescence usually long to short cylindrical or lax, usually many flowered; (iii) calyx segments entire or bidentate, rarely with four teeth; (iv) corolla (16 to) 22 to 24 (to 31) mm long, tubular-bell shaped; purple, pink, rarely dirty yellow, light brown; and (v) stigma purple, orange, or yellow (Piwowarczyk et al. 2019, 2020). For molecular analysis, total genomic DNA was extracted from the sample, and then the plastid rubisco large subunit (*rbcL*) sequence was amplified and sequenced with the protocol described in Piwowarczyk et al. (2015). The sequence (1,231 bp) was deposited in GenBank (MN384886). BLAST search found that the most similar sequence (query cover 100%, identity 100%) was *O. laxissima* (KR260928). To the best of our knowledge, this is the first report of *O. laxissima* parasitizing *P. granatum*. *O. laxissima* appearing in large numbers on a single pomegranate shrub can weaken it, affect its flowering and thus fruiting, but the scale and significance of this impact requires further research. Usually, in the Caucasus region, *O. laxissima* was observed in mesophilic forests and shrubs, but our report suggests the possibility of a potential spread in the future of this polyphagous parasite on the neighboring cultivated areas, especially fruit trees and shrubs. Until now, only one report was known of *P. granatum* as a host of the other broomrape species, such as *Phelipanche aegyptiaca* (Pers.) Pomel and *O. crenata* Forssk. in Israel (Dor et al. 2014).

References:

- Dor, E., et al. 2014. Plant Dis. 98:859.
- Piwowarczyk, R., et al. 2015. Ann. Bot. Fenn. 52:411.
- Piwowarczyk, R., et al. 2019. Phytotaxa 386:001.
- Piwowarczyk, R., et al. 2020. Plant Dis. 104:1878.
- Shaygannia, E., et al. 2016. JEBCAM 21:221.

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[†]Indicates the corresponding author.
R. Piwowarczyk; renka76@wp.pl