BIOECOLOGICAL PROPERTIES OF BROOMRAPE (*OROBANCHE*) AND ITS DAMAGE TO CROPS

Umurzakova Umida Elmurodovna
"Agronomic" faculty of Samarkand veterinary medicine institute. mamasaliyev1991@mail.ru, Cell: +9989333815-612 , Samarkand, Uzbekistan

Abstract

The article describes the morphological characteristics - height, flower, stem, goustoria of the parasitic weed broomrape (Orobanche) and gives information on their damage to agricultural crops.

Keywords: *weeds, broomrape, parasites, vegetables, melons, sunflower, tobacco, polymorphism.*

Introduction. Broomrape (*Orobanche*) - obligate parasite, belonging to the family of high-flowering plants Orobanchaceae Vent., consisting of 15 generations, mainly distributed in the northern hemisphere of the world. The genus Orobanche L. has 150 species, most widespread in the area and develops in many host-plants, Broomraредошлар – is specialized parasite, lives as a parasite in indoor and outdoor plants belonging to 42 families[1, 2, 3, 4]. Among the broomrape species that cause the most damage to crops: Orobanche cumana Wallr., Orobanche ramosa L., Orobanche aegyptiaca Pers., Orobanche mutelii F. Schultz., Orobanche lutea Baumg.

These species of Broomrape are parasitic on a single species, several species, or many species of a particular species of plant.

Species of broomrape distributed in the flora of Uzbekistan were studied by J.T. Kobulov (1978) and its species composition was noted.

In Uzbekistan, broomrape species as Egyptian broomrape, knarred broomrape and cabbage broomrape is widespread.

Of these, the Egyptian broomrape (Orobanche aegyptiaca Pers.) is the most common, infecting more than 100 species of plants in different families. The harm of broomrape can vary in melons, vegetables and technical crops. Egyptian broomrape has been found to damage an average of 50-60% of vegetable crops and destroy more than 20-25% of the crop [5, 7].

There is also very little information about the damage that the broomrape parasite causes to the yield and quality of a particular plant. Especially in recent years, the broomrape parasite has caused serious damage to agricultural crops. Methods of combating it are poorly studied and not introduced into production.

Methodology of the experiment. The research was conducted in the experimental fields of Samarkand branch of Research institute of vegetable crops and potato in the fields planted by Virginia by the farms "Oblokul Boymatov Fortress", "Nasimboy Kurbanov Sakhovati" Urgut district of Samarkand region of the Republic of Uzbekistan.

The following methodological developments were used in the research:

- methodological instructions for testing the biological method of combating Egyptian broomrape on vegetable and melon and tobacco plantations, Moscow, 1967.

- guidelines for testing insecticides, acaricides, biologically active substances and fungicides.

Tashkent, 2004 (Sh.T.Khojaev and others).

- methodology for conducting field experiments to protect tobacco from harmful organisms. Krasnodar,1994.

Experiments and observations were conducted on 5 crops: tobacco, melon, cucumber, tomatoes, sunflower.

Areas infested with broomrape (orobanche) and undamaged areas were identified in each farm field, and observations and calculations were made. All calculations are in 20 fields, the size of each field is 1-1.5.

The main part. As a result of thousands years of evolution, broomrape adapted to a parasitic lifestyle, adapting to a number of biological characteristics, such as a high adaptation degree to the external environment, a large multiplication factor (1 plant produces 150-200 thousand seeds), its seeds stored in the soil for a long time (10-12 years), when favorable conditions arise, the host plant settles in the root system and forms a number of biological features, such as germination.

Our experiments results show that rapid growth and development is observed mainly in melon crops. In particular, in the fields of horticultural farms of Bulungur district in experiments conducted in September-October 2019 in melon and cucumber plants, broomrape height is 38,3 and 37,1 cm, flowering stems are 16,8 and 14,2 cm, number of flowers is 239,1 and 200,2, flower size is 2,7 and 2,5 cm respectively. This means that broomrape grows better in melon and cucumber than in tobacco, tomatoes and sunflower in the northern districts of Samarkand region, and it causes a lot of damage to plants (Table 1).

Table 1

Dependence of morphological features of Egyptian broomrapes on the host-plant species

№	Host-plant	Broomrape height, cm	Broomrape's flower-bearing stem, pcs	Number of flowers, pcs	The flower size, cm
1	Tobacco	32,5	10,8	203,5	2,3
2	Tomatoes	35,3	12,2	221,8	2,5
3	Sunflower	33,8	13,5	172,4	2,2
4	Melon	38,3	16,8	239,1	2,7
5	Cucumber	37,1	14,2	200,2	2,5

Broomrape species that live parasitically on perennial plants live as perennial parasites. Some species have vegetative reproduction. Broomraping parasitic species in annual plants coexist with the host plant or migrate to perennials. It was found that they can live up to 8–14 days after the host plant death. Biennial species of the parasite are also found in some places. In the first year the host plant forms a tuber-like fleshy tissue in the root system, and in the second year the stem sprouts from it. Some researchers believe that broomrape, which parasitizes perennial plants, may also have the ability to reproduce vegetatively. In this case, in the secondary gaustoria (suckers) form a bud tumor, which later separates from the mother plant and begins to parasitize independently.

The Egyptian broomrape mainly parasitizes on annual plants and usually ends its vegetation along

with the host-plant. In some cases, the parasite can also live in ephemeral weeds. The broomrape, which parasitizes ephemeral plants, is as short-lived as the host-plant, and in some cases dies during the flowering period or during the immature seeds formation. These parasite properties can be used in the fight against it.

Flexibility and polymorphism as well as morphological variability are strongly developed in the parasite-plant broomrape. Professor D.T. Kabulov [1] in Zarafshan valley, it was found that the morphological features of Egyptian broomrapes in melon, watermelon, pumpkin, cucumber, tomatoes, tobacco and sunflower crops have different forms and these traits are not passed from generation to generation.

In the Tobacco plant, the Egyptian broomrape forms a lot of horns, which can be clearly observed, especially during the period of rapid growth of the plant. In doing so, the parasite attaches itself to the well-developed lateral root of the tobacco or to the root part near the root collar with its suckers. The presence of a large amount starch in the absorbing part of the parasite ensures that its growth is accelerated.

The Egyptian broomrape parasite is found in the soil in the host-plant root system and forms 40,5% in melon, 10,7% in watermelon and 13,9% in tomatoes. The remaining parasites settle in the deeper part of the root soil, and they begin to germinate the host-plant throughout the entire growing season, thereby damaging the plant throughout the growing season. The parasite has the ability to germinate again even when torn off three times.

The parasite germinates in 30-40 cm radius around the tobacco plant and in some cases even farther away. Broomrape seeds germinate even at 30-40 cm depth in the soil, and the suckers diameter reaches 3 cm. In experiments conducted by Professor D.T. Kobulov [1] in Samarkand region, it was found that the maximum number of parasites grows from 20 cm depth in the soil. Taking into account this feature of the parasite, the deep plowing importance in the fight against it is great.

The Egyptian broomrape parasitizes in host-plants in a hidden state in the root zone of the soil without appearing on the ground. Its main damage to the host-plant occurs in the soil part where the parasite is located, the last stage of its germination on the ground, and after flowering it begins to dry out.

According to A.V. Zagorovsky [6], in Kyrgyzstan it is estimated that 9 million broomrape seeds are produced per 1 m^2 of tobacco area. Because the seeds are so small, they can be spread by wind, humans, animals, as well as irrigation water.

Broomrape's flowers are pollinated by insects, mainly by phytomase flies. However, according to professor I.G. Beilin, a scientist who has worked with broomrape for many years, [5] it has been reported that the broomrape seeds are also formed in the insulator.

The height and width of the broomrape stem, the number and size of the flower, the number of pods and seeds in it depend on the parasite type, the natural and agronomic conditions in which the host-plant grows and the number of parasites growing on the host-plant root. In our study, we conducted experiments to determine the onset period of broomrape developmental stages (Table 2). The table shows that the beginning of the germination period of broomrape was first observed in melon (14.07) and cucumber (18.07), while the longest growing period was observed in tobacco, tomatoes and sunflower, the broomrape growth period duration in these plants was 42, 40, and 41 days, respectively.

Table 2

Onset period of broomrape developmental stages

№	The host plant	Sprouting	Flowering		Fruiting		The period from germination to the end of growth, day
			beginning	full flowering	beginning	full fruiting	
1	Tobacco	21.VII	1.VIII	5.VIII	12.VIII	18.VIII	42
2	Tomatoes	25.VII	5.VIII	9.VIII	16.VIII	22.VIII	40
3	Sunflower	28.VII	6.VIII	11.VIII	15.VIII	19.VIII	41
4	Melon	14.VII	23.VII	27.VII	29.VII	3.VII	38
5	Cucumber	18.VII	27.VII	2.VII	4.VIII	9.VIII	35

The infestation degree of agricultural crops with broomrape also depends to some extent on the growth rates in the host plant body of the broomrape. Our experiments results to determine the growth rates of broomrape in different host plants show that broomrape can grow the highest in tobacco, sunflower and melon plants. In these plants, by the end of the growing season, the broomrape stems height was 39,2, 41,2 and 42,4 cm, respectively (Table 3).

Table 3

Growth rate of broomrape in different host plants

№	The host plant type	Broomrape stem height, cm				
		10.VII	22.VII	4.VIII	14.VIII	25.VIII
1	Tobacco	2,1	8,5	17,3	34,3	39,2
2	Tomatoes	1,7	7,8	16,5	31,8	37,4
3	Sunflower	1,1	7,5	15,2	34,0	41,2
4	Melon	2,9	8,9	19,3	34,2	42,4
5	Cucumber	1,3	6,5	16,1	34,1	38,8

Thus, it can be concluded from the above data that in some broomrape species, especially in Egyptian broomrape, the parasitic adaptation properties were sharply realized, as a result, they had a strong manifestation of morphological variability. Typically, in tobacco, the Egyptian broomrape has a strongly branched stem, forming a single stem by September-October. On this stem phytomiza flies lay eggs. The larvae that hatch from the egg feed on the broomrape seed, thereby drastically reducing its offspring. In this way its seed yield is reduced by 60–65%. When tobacco was severely infested with Egyptian broomrape, it was found that there were 15-20 parasites in each plant root at different developmental stages, ranging in height from 10 cm to 40 cm.

When the broomrape in tobacco fields is usually harvested at different developmental stages, the tobacco root is injured, the part of the parasite that sticks to the root remains and new stems will grow from it in a short period of time under favorable conditions and forms 15–20 flowering buds (seeds).

The duration of the developmental stages of Egyptian broomrapes usually depends on the host plant vegetation. In some ephemeral plants the development period of broomrape is up to 20 days, while in tobacco it develops up to 40-45 days and is characterized by many branches formation at the base. In

tobacco plants, flowering begins 12-14 days after the appearance of the parasitic tumor and the sloping flowering period is observed after 16-18 days. At the end of the flowering period, the period of budding lasts up to a week. Due to the chemical composition of the broomrape parasite, which contains a number of toxins - glucosides and alkaloids (rinantin, arobancholine), livestock do not eat it.

Conclusions. In broomrape, especially in Egyptian broomrape, adaptive and polymorphic features are strongly developed, with non-hereditary and variable morphological features. The parasitic lifestyle of the parasite in host-plants for a long time has formed the characteristics that it produces a lot of seeds and retains their viability for several years (10-15 years). Taking into account that the parasite seeds are mainly located at 20-30 cm depth in the soil, deep plowing (30-35 cm) can be used in the fight against the parasite. The main harmful effect of the parasite on the host plant is until it sprouts on the soil surface. All its biological properties should be taken into account in the effective methods development of combating the parasite plant-broomrape.

References

1. Kabulov D.T. Infectious diseases of Central Asia//Tashkent. - Publishing house Fan.– 1978. -p. 33 – 40.
2. Beilin I.G. Parasitism and epiphytothiology (on the example of parasites from higher plants) // Moscow. - The science. - 1986. - p. 103-127.
3. Linke K.H., Sauerborn J. ,Saxena M.C. Orobanche field Guide// University of Hohenheim. - FR Germany. -1989.- P. 41.
4. Umurzoqov E.U., Ahmedov S.I., Fayzullaev B. Scientific substantiation of Broomraping (Orobanche) damage to agricultural crops //International Conference on Agriculture, Regional Innovation and International Cooperation.- 2017. – Samarkand.-268-271 p.
5. Beilin I.G. Fight against dodders and broomrape.//Moscow.- 1967. - p. 13-34.
6. Zagorovsky A.V., Broomrape and measures to combat them.// Frunze.-1956.-p.23-56.
7. ConnC. E., Bythell- DonglasR. NeumannD. Convergent evolution of strigolactonepereeption enabled host detection in parasitic plants//Science.- 2015.-pp. 540-543.
8. Umurzakov E.U., Akhmedov S.I., Umurzakova U.E. etc. Parasitic weeds and their control.// Monograph.-Samarkand.- 2019.- 150 p.