

The subgenus *Rumex* includes about 150 species (Datta, 1952), among which are some of the most widely spread plants all around the world (Rechinger, 1949b). The natural hybridization of the subgenus *Rumex* is a natural process, revealed in high frequency in this group plants. This is confirmed by the fact that, in historical aspect, the description of new hybrid combinations is a process, continuing to the present day. Practically, all possible hybrid combinations of the taxa in the subgenus have been described. The natural hybridization of the subgenus *Rumex* in the Bulgarian flora has not been purposefully researched so far. The data about the distribution of natural hybrids on the territory of Bulgaria is quite poor. The first hybrids for the country have been reported by Urumov, 1901; Širjaev, 1922; Stoyanov & Stefanov 1924; Rechinger, 1933. In most cases, the date about the interspecies hybrids is rather generalized and incomplete – individual habitats were reported more than 50 years ago, which were not confirmed afterwards or there were no herbarium materials of Bulgarian origin deposited. In the last several decades new hybrids of *R. obtusifolius* L. × *R. patientia* L. (*R. × erubescens* Simonkai) and *R. crispus* L. × *R. stenophyllus* Ledeb. (*R. × intercedens* Rech. pat.) were reported for Sofia (Panov, 1987). The hybrids of subgenus *Rumex*, described and specified for the Bulgarian flora, have not provided a sufficiently complete idea about the volume and spreading of the natural hybrids in the country. The lack of systematic researches in the group has led to slowing down the knowledge about the subgenus *Rumex* as a whole and in particular about its hybrids in Bulgaria. Perhaps for this reason natural hybrids are often deposited as species in the Bulgarian herbaria.

The present publication is based on literature data, herbarium samples and author groups and its purpose is to actualize and present the available information, regarding the spreading of some natural hybrids of the subgenus *Rumex* in Bulgaria.

#### Material and methods

The materials have been collected by the author in the period 2003–2005 from natural habitats in the country. The herbarium samples of the hybrid forms have been deposited in the SOA herbarium – Agricultural University of Plovdiv.

The collections in the three Bulgarian herbaria (SOM – Institute of botany, BAS; SO – Biological Faculty, Sofia University; SOA – Agricultural University - Plovdiv) have been revisited. In the analysis of hybrids, from which no herbarium materials have been deposited in the country, comparative samples from the Herbarium of the Wien University (WU) and the Herbarium of Natural Science (W) have been used. The herological information has been processed in a related data base by the software program "dSOA" (Stoyanov, 2003), on the grounds of which map-distribution of the spreading of the examined hybrids have been made out. The data are presented according to Kozuharov & al. (1983).

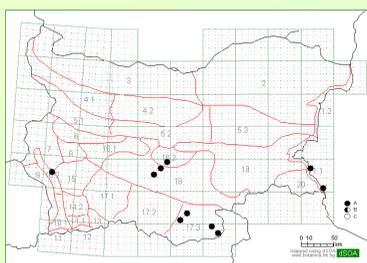


Fig. 1. Distribution map for *R. conglomeratus* × *R. crispus*. (A – new data; B – herbarium specimens; C – literature data)

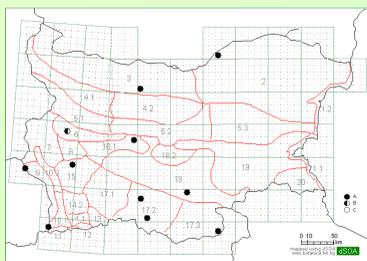


Fig. 2. Distribution map for *R. obtusifolius* × *R. patientia* (A, B, C – see fig. 1)

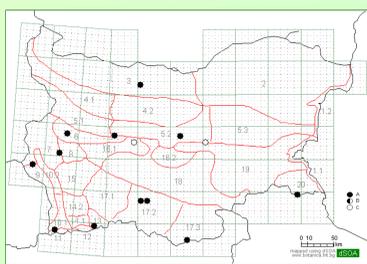


Fig. 3. Distribution map for *R. crispus* × *R. obtusifolius* (A, B, C – see fig. 1)

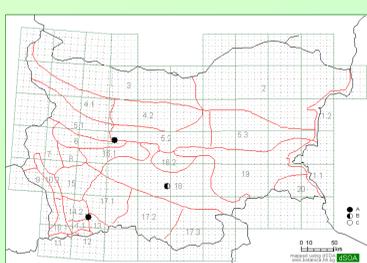


Fig. 4. Distribution map for *R. crispus* × *R. patientia* (A, B, C – see fig. 1)

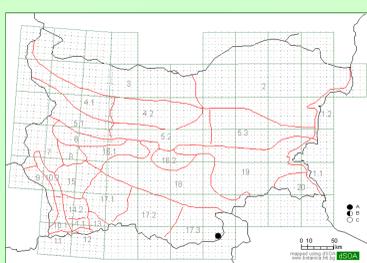
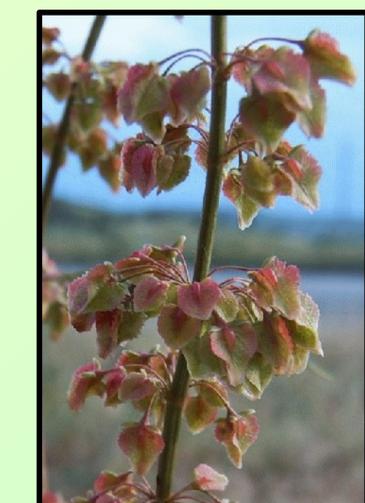


Fig. 5. Distribution map for *R. cristatus* × *R. obtusifolius* (A, B, C – see fig. 1)



#### *Rumex obtusifolius* L. × *R. patientia* L.

Panov provides data for this hybrid for the region of Sofia (1987). The information is supported by a hybrid sample.

**New data** for NE Bulgaria; Danubian plain; West Frontier mountains; Belasitsa; Rila; Western Sredna Gora; Western and Eastern Rhodopes; Thracian plain (fig. 2)

This hybrid combination is widely spread in Macedonia, Bosnia, Croatia, Rechinger (1943).

#### *Rumex conglomeratus* Murray × *R. crispus* L.

There is no data in literature or deposited herbarium samples of Bulgarian origin for the hybrid combination.

**New data** for South Black Sea Coast; Znepole region; Western Sredna Gora; Eastern Rhodopes; Thracian plain (fig. 1).

#### *Rumex crispus* L. × *R. obtusifolius* L. s. l.

Literature data show that the hybrid is distributed in the middle part of the Stara Planina mountain over the town of Klisura under the name *R. pratensis* W. K., without specifying its hybrid appearance. Later on, it was reported for the Rhodopi mountain, but there are no samples deposited in the Bulgarian herbaria under this name. As a result of revisions, three samples of Bulgarian origin, belonging to the hybrid combination, have been determined.

**New data** for Danubian plain; Central Stara planina; West Frontier mountains; Valley of Mesta river; Western and Eastern Rhodopes; Strandzha mountain (fig. 3).

#### *Rumex crispus* L. × *R. patientia* L.

Stoyanov (1932) provides data about the spreading of the hybrid in the country for the Thracian valley on the basis of one herbarium sample, initially determined by Stribarni as

*R. obtusifolius* and later revised by Rechinger, belonging to the hybrid combination.

**New data** for Central Stara Planina; Valley of Mesta river (fig. 4)

Taking into consideration the wide spreading of the parent species in Bulgaria, it is not impossible the hybrid to be spread in a vaster area.

#### *Rumex cristatus* DC. × *R. obtusifolius* L.

There is no literature data or materials deposited of the hybrid form. The hybrid is new for the Bulgaria.

**New data** for Eastern Rhodopes (fig. 5).

#### *Rumex palustris* Sm. × *R. obtusifolius* L.

This hybrid has been established for first time for Bulgaria.

**New data** for Western Sredna Gora; Thracian plain (fig. 6).

#### *Rumex palustris* Sm. × *R. stenophyllus* Ledeb.

Stojanov (1932) provides the only literature data about the hybrid in Bulgaria for the mouth of the Kamchia river.

**New data** for NE Bulgaria; Danubian plain (fig. 7).

#### *Rumex confertus* Willd. × *R. obtusifolius* L.

There is no literature data or materials deposited of the hybrid form of Bulgarian origin.

**New data** for NE Bulgaria (fig. 8)

#### *Rumex sanguineus* L. × *R. conglomeratus* Murray

Literature data about the hybrid in the country are provided by: Širjaev (1922) for the Preobrazhenie Monastery (together with the parent forms) and Stoyanov & Stefanov (1925) with locality Predbalkan (Tarnovo). There are no materials deposited of the hybrid form of Bulgarian origin.

**New data** for Southern Black Sea Coast; Eastern Rhodopes (fig. 9)

#### *Rumex patientia* L. × *R. pulcher* L.

The hybrid is new for the country. There is no literature data or materials deposited of the hybrid form of Bulgarian origin.

**New data** for Valley of Mesta; Eastern Sredna Gora; Eastern Rhodopes (fig. 10).

#### Results and discussion

The hybrid samples, deposited at the Bulgarian herbaria are limited in number, in most cases individual samples. Hybrid forms have very often been deposited as species and their hybrid appearance has been determined as a result of revisions. The object of the present research are ten hybrid combinations among taxa from the subspecies. There are no materials deposited in the herbarium for five of them. As a result of revision, three herbarium samples have been specified for the combination *R. crispus* × *R. obtusifolius*.

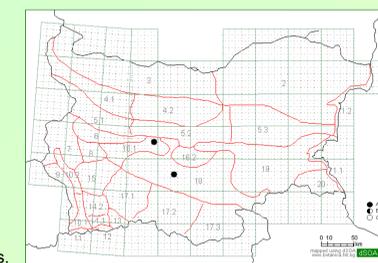


Fig. 6. Distribution map for *R. palustris* × *R. obtusifolius* (A, B, C – see fig. 1)

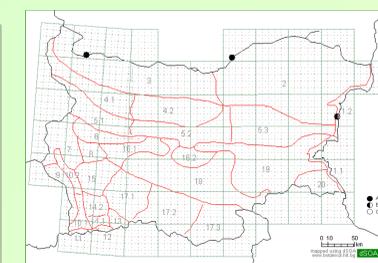


Fig. 7. Distribution map for *R. palustris* × *R. stenophyllus* (A, B, C – see fig. 1)

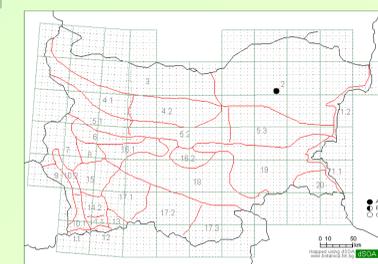


Fig. 8. Distribution map for *R. confertus* × *R. obtusifolius* (A, B, C – see fig. 1)

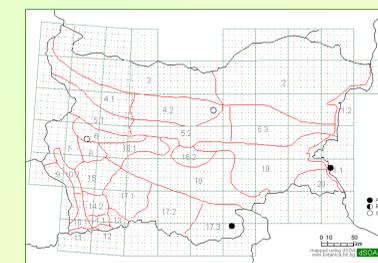


Fig. 9. Distribution map for *R. sanguineus* × *R. conglomeratus* (A, B, C – see fig. 1)

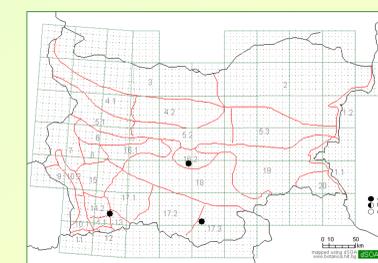


Fig. 10. Distribution map for *R. patientia* × *R. pulcher* (A, B, C – see fig. 1)



#### Conclusion

The present survey is a contribution to the problems of natural hybridization between the taxa of subgenus *Rumex* in Bulgaria. A precise, chronological mapping of well-known hybrids from the subgenus has been done for the first time in the country, based on literature data and herbarium samples. The information accumulated and processed so far enriches the chronological information for the natural hybrids of the subgenus *Rumex*, object of the present survey. New hybrid combinations have been established on the territory of the country: *R. conglomeratus* × *R. crispus*, *R. confertus* × *obtusifolius*, *R. cristatus* × *obtusifolius*, *R. palustris* × *R. obtusifolius* и *R. patientia* × *R. pulcher*. The presence of *R. crispus* × *R. obtusifolius* in the Bulgarian flora has been confirmed. The observations show, that most probably, the volume of natural hybrids is bigger, so further researches over the natural hybridization of the taxa of the subgenus *Rumex* in Bulgaria are necessary.