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Distribution of the European rabbit (*Oryctolagus cuniculus*) in Romania

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Abstract. The European rabbit, *Oryctolagus cuniculus*, is a widespread colonizer and is considered a pest outside its natural range, where eradication of the rabbit is priority for conservation. Original distribution of the after last ice age included Iberian Peninsula (both Spain and Portugal) to western France and northern Africa, and the introduction throughout Western Europe is thought to have occurred as early as the Roman period. It is debatable if European rabbit is native or not to Romania; IUCN lists it as introduced, being native only to: Algeria, France, Gibraltar, Morocco, Portugal and Spain. The European rabbit was introduced or re-introduced in Romania for hunting purposes in counties such as: Alba, Bacău, Botoşani, Braşov, Buzău, Covasna, Dolj, Iaşi, Ilfov, Maramureş, Mureş, Prahova, Sibiu, Timiş and Vîlcea. Many introductions date long time ago, some of them before 1900s. At present, it can be found only in two counties: for sure in Timiş (Timiş Meadow) and possible in Sibiu. In most of other counties where it was introduced the rabbit populations are extinct in the wild. The reasons for these extinctions are the nature of the soil, cold winters, predators and pathogens. Even in low number, the European rabbit is a species of hunting purpose and according to Romanian legislation it can be hunt all year long for meat and fur. It is also a reservoir of wild genes, useful for the genetic improvement of the domestic rabbit. The invasive potential of *Oryctolagus cuniculus* in Romania is quite low. The present research maps the main populations of European rabbits in Romania.
Key Words: Native, distribution map, wild genes, gene reservoir.

Introduction. It is important for each European country to inventory its fauna (Covaciu-Marcov et al 2009) either native or non-native (Iacob & Petrescu-Mag 2008). The European rabbit (*Oryctolagus cuniculus*) is a widespread colonizer and is considered a pest outside its natural range, where eradication of the rabbit is priority for conservation (Smith & Boyer 2008). However, in many countries (where it occurred in the past) the number of European rabbits is decreasing, and such a country is Romania (Bud et al 2011). Original distribution of the after last ice age included Iberian Peninsula (both Spain and Portugal) to western France and northern Africa (Smith & Boyer 2008; Bud et al 2011), and the introduction throughout Western Europe is thought to have occurred as early as the Roman period (Smith & Boyer 2008). It is debatable if European rabbit is native or not to Romania; IUCN lists it as introduced, being native only to: Algeria, France, Gibraltar, Morocco, Portugal and Spain (Smith & Boyer 2008). In any case, *O. cuniculus* is a valuable animal for hunting purposes and a reservoir of wild genes in view of genetic improvement of the domestic rabbit. Its invasive potential in Romania is quite low. The present research aim to map the main populations of European rabbits in Romania.

Material and Method. Because the literature is extremely poor in data on the presence of the European rabbit in Romania, the present research is based on interviews with different types of specialists, hobbyists, hunters, and also on official documents, reports and statistics of the associations of hunting and silviculture in Romania. When answers were not sure (or "hunting stories") they were considered for our synthesis only when they were confirmed by other specialist, report, statistic, or by literature. No single report was considered for the present study to avoid errors or confusions. Interviews and data collection started in January, 2013, it was finished in August, 2014, and the research contains more than one hundred of non-citable sources of information.

Results and Discussion. According to history of the species in Romania, *O. cuniculus* was introduced in the wild before 1900s in Transylvania. No precise locations of these introductions were indicated by literature. In 1905, a new introduction had place in the neighborhoods of Iaşi (locality: Cristeşti). Specimens released in the wild at Cristeşti were imported from France (Bud et al 2011). After 1973, new introductions had place in the counties of Alba, Bacău, Botoşani, Braşov, Buzău, Covasna, Dolj, Ilfov, Maramureş, Mureş, Prahova, Sibiu, Timiş, Vîlcea (see Figure 1), and they were confirmed by many specialists in hunting and silviculture. Although we have reports about the introduction of the European rabbit in Timiş County (project which failed in the first winter), it is possible that feral rabbits were present in the area before the introduction. In fact, from interviews, Timiş Meadow seemed the most accurate location where the European rabbit established self sustaining populations. These feral populations could be the result of one or more introductions, but also it could be the result of the natural expansion of the rabbit from the Central and Western Europe. Sibiu County is the other location where it is possible to find feral rabbits. However, about this second county we have only two reports (see Figure 2).

In most of other counties where it was introduced the rabbit populations are extinct in the wild. Specialists explained several different reasons for these extinctions: the nature of the soil, cold winters, predators and pathogens.

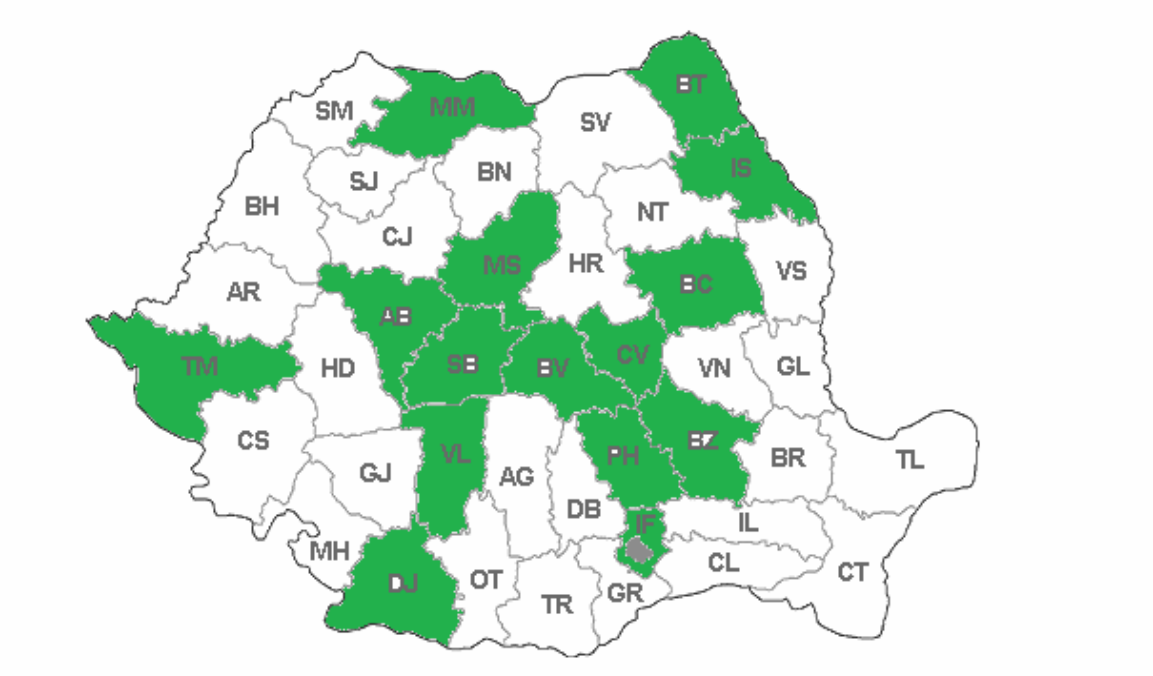

Figure 1. Introduction of European rabbit in Romania (in green).

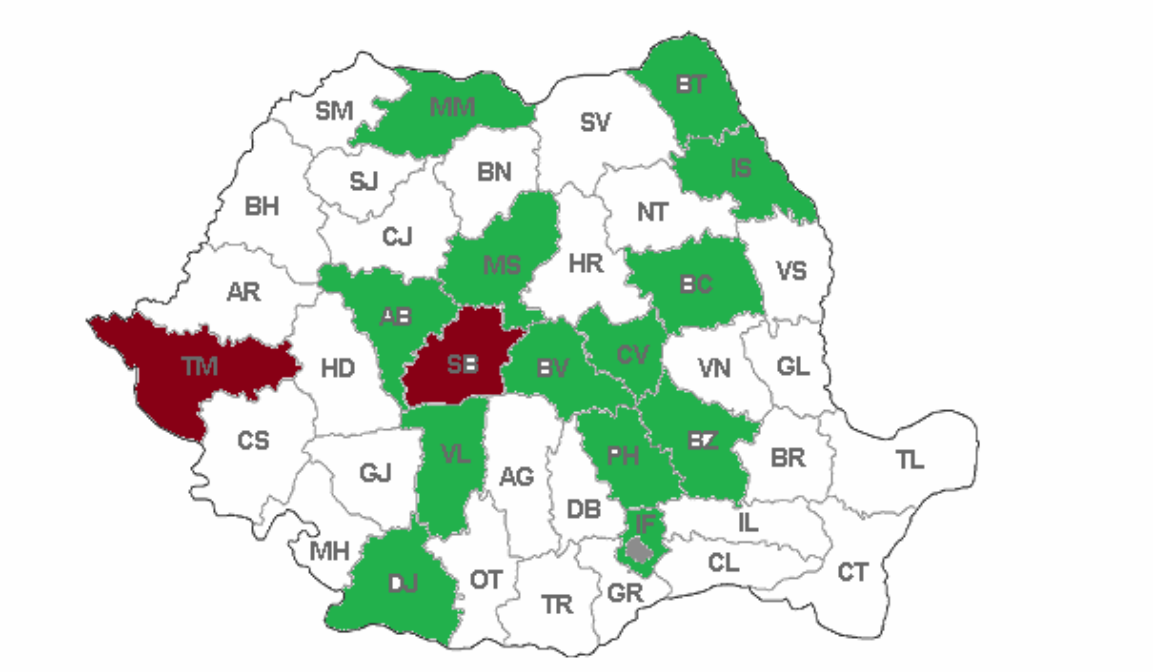

Figure 2. Two counties where European rabbits seem to exist at present (in brown).

The nature of the soil is the most frequent explanation by specialists. The European rabbit prefers light, dry, sandy and sunny soils, because their underground galleries are made easily in such kind of soils (Bud et al 2011). Romanian soils, except some small regions in South and West of the country, are compact and hard (Cirita et al 1974). They become even harder in winter when they are frozen.

Cold winters kill the kits in the nest, but also make impossible the excavation of galleries. On the other hand, the rabbits are static and for this reason the food resources are not enough after the snow falls.

Predators of rabbits and hares are about the same. Predators' attack is more efficient when the prey lives in colonies and the colony is static (Wanjie 2013; Thompson 2014). Compared to *O. cuniculus*, which prefer to stay in the same land in colonies, *Lepus europaeus* is solitary and nomad (Wray 1992). That is an advantage for the second because, once the predators find a location plenty of rodents, they will keep on hunting there.

Like in the case of predators, most pathogens affecting rabbit health and hare health are the same (Graham 2014; Le Gall-Recule et al 2013). The difference consists in propagation of the pathogen. Viruses, bacteria and protozoan parasites spread more efficient from one host to another in colonies (Jing et al 2012; Laidlaw 2014). That makes the rabbit to be more affected by pathogens and mortality.

Although the populations are decreasing in number, the European rabbit is a species of hunting purpose and according to national law it can be hunt all year long for meat and for fur. *O. cuniculus* is also a reservoir of wild genes, useful for the genetic improvement of the domestic rabbit (Petrescu-Mag et al 2015).

Conclusions. The European rabbit is considered non-native to Romania. It was introduced for hunting purposes in counties such as: Alba, Bacău, Botoşani, Braşov, Buzău, Covasna, Dolj, Iaşi, Ilfov, Maramureş, Mureş, Prahova, Sibiu, Timiş and Vîlcea. Many introductions date long time ago, some of them before 1900s. At present, it can be found only in two counties: for sure in Timiş (Timiş Meadow) and possible in Sibiu. In most of other counties where it was introduced the rabbit populations are extinct in the wild. The reasons for these extinctions are the nature of the soil, cold winters, predators and pathogens. Even in low number, the European rabbit is a species of hunting purpose and according to national legislation it can be hunt all year long for meat and fur. It is also a reservoir of wild genes, useful for the genetic improvement of the domestic rabbit.

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