

Europe, a continent with high potential for the cultivation of the Burgundy truffle (*Tuber aestivum/uncinatum*)

GÉRARD CHEVALIER

Résidence Cristelle, 33 rue des Vergers, F-63800 Cournon d'Auvergne, charlemagne33@orange.fr

Chevalier G.: *Europe, a continent with high potential for the cultivation of the Burgundy truffle (Tuber aestivum/uncinatum)*. Acta Mycol. 47 (2): 127–132, 2012.

The Burgundy truffle (*Tuber aestivum/uncinatum*) grows, in Europe, in the most varied soils from a physical and chemical viewpoint. The only common point is the presence of a minimum level of exchangeable calcium in the soil. The truffle soils in Europe can be classified in two categories: the soils coming directly from the parent rock, and those formed from deposits covering the parent rock. The first group corresponds to most traditional truffle areas, France, Italy and Spain. It is also true for some soils from Ireland to Eastern Europe (Romania, Bulgaria), from Southern Europe (Greece, former Yugoslavia) to Northern Europe (Sweden, Baltic countries). The sedimentary layers that cover most areas are from the secondary and tertiary era. The primary parent rocks are less frequent. The second group means quaternary or recent alluviums covering the parent rock on huge surfaces and at great depth sometimes. They characterize mainly countries Eastern and Northern Europe.

By bringing within reason limestone, it is possible to cultivate *T. aestivum/uncinatum* on sedimentary soils non-calcareous or decalcified or even on soils issued from magmatic rocks (granite) or metamorphic (schists). The possibilities of truffle cultivation in Europe are therefore enormous, the limiting factors not being the soil but the climate.

Key words: truffles, soil, calcium, liming, truffle cultivation

INTRODUCTION

Hundreds of soil analyses carried out from the 1970's show that the Burgundy truffle (*Tuber aestivum/uncinatum*) grows, in Europe, in the most varied soils from a physical and chemical viewpoint, far more than the soils for *T. melanosporum* and even more for *T. magnatum*. The only common point is the presence of a minimum level of exchangeable calcium in the soil (Chevalier 2011).

The nature of the parent rock conditions the soil physico-chemical characteristics. The soils derived from calcareous parent rock, named calcimagnesian soils

or calcimorphic soils are “intrazonal” soils, that are linked more to the nature of the parent rock they were derived from, than the climatic zone where they reside (Mathieu 2009). Under humid temperate climate, the evolution of the calcareous parent rock is linked to the decarbonation of this rock.

TRUFFLE SOILS

The truffle soils in Europe can be classified in two vast categories: the soils coming directly from the parent rock, and those formed from deposits covering the parent rock (Fig.1).

The first group corresponds to the most traditional truffle areas, France (Chevalier 2008, 2010a; Chevalier, Frochot 1997; Chevalier, Palenzona 2011; Chevalier et al. 1979) (Fig.2), Italy (Bencivenga 2008; Granetti et al. 2005; Gregori 1991, 2010; Raglione et al. 2011; Zambonelli, Di Munno 1992) and Spain (De Miguel et al. 2008; Honrubia et al. 2011). It is also true for some soils in the United Kingdom (French 2008), Ireland, Germany (southern half) (Fig.3), Switzerland (Groux, Keller 2008), Austria (Urban, Pla 2008), Czech Republic, Slovakia (Gazo, Miko 2008, 2010), Southern Poland (Hilszczańska, Sierota 2010; Lawrynowicz 2011) (Fig.4), Hungary (Bakony Mountains) (Bratek 2008; Bratek et al. 2010), Romania (Carpathian Mountains), Bulgaria, Greece, former Yugoslavia (Marjanovic 2008), Sweden (Isles of Gotland and Öland) (Wedén, Danell 2010; Wedén et al. 2004), Baltic republics. The sedimentary layers that cover most areas are from the secondary and tertiary era. The primary parent rocks are less frequent: Ireland, northern United Kingdom, the Ardennes and Eifel hills, Rhenish schist massif, the Harz, southwest of Saxony and southeast of Thuringia, Bohemia, southern Poland (Silesia, Katowice region, Lysa Gora), Swedish isles, Baltic republics.

The second group means quaternary or recent alluviums covering the parent rock on huge surfaces and at great depth sometimes. They characterize the Po Valley, southern Germany (glacial till), the Austrian, Slovak, Hungarian and Romanian plains. Large areas also are found above the glacial line showing the maximal advance of the quaternary glaciers. This is valid for the northern half of the Netherlands, Denmark, Northern Germany (Fig. 3), Poland (Fig. 4), Belarus and Ukraine. In this second group the alluviums which cover the parent rock are calcareous or calcic (loess) and the truffle can grow; the alluvium are free of limestone or calcium and the truffle fails to develop, even though the parent rock may be calcareous but deep.

By bringing within reason limestone, it is possible to cultivate *T. aestivum/uncinatum* on sedimentary soils non-calcareous or decalcified or even on soils issued from magmatic rocks (granite) or metamorphic (schists) (such a cultivation in France from the 2000's) (Chevalier 2003, 2010b). The sedimentary soils of this type cover large surfaces in Northern Europe, North of the glacier most advance demarcation.

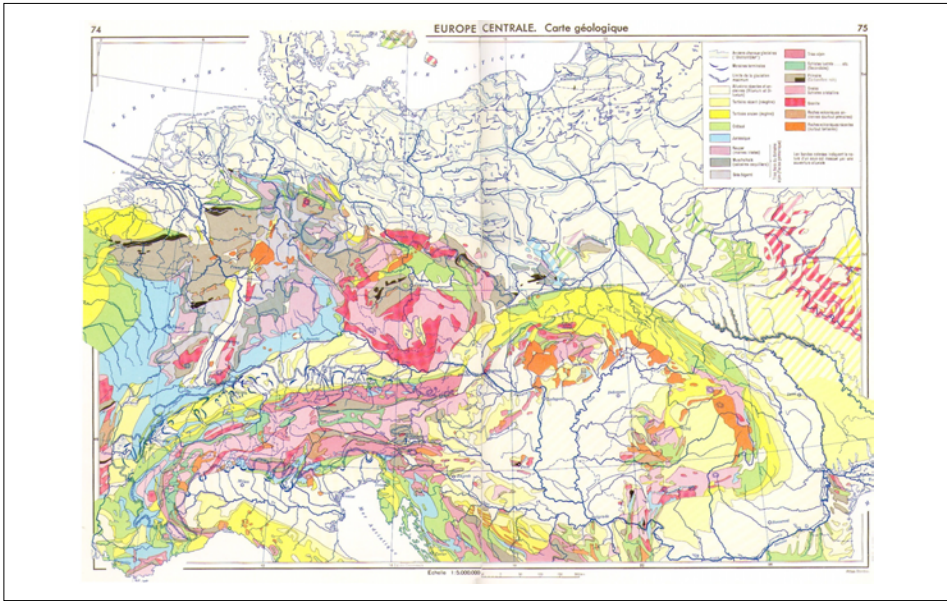


Fig. 3. Truffle soils of Germany.

Germany presents the two types of soils: deposits covering the parent rock in the north (in beige and grey); soils originated from breaking up of the parent rock in the south. The soils of the southern part are more suitable for truffles.

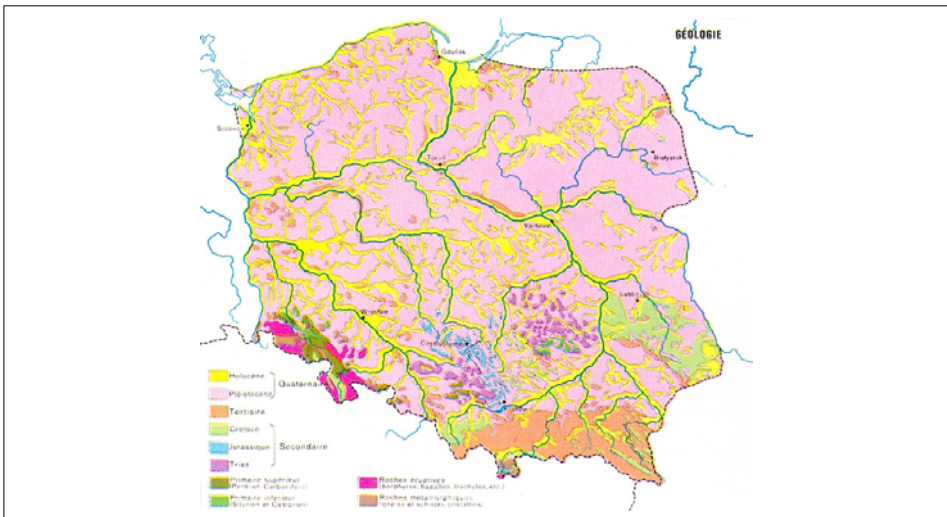


Fig. 4. Truffle soils of Poland.

The great Poland plain is covered by quaternary deposits from glacier or wind origin. The soils of the southern Poland are quite different and closer to those of Southern Europe but their surface is more limited. They are originated from the breaking up of the parent rock that can be Jurassic (north-west of Krakow, in blue), Cretaceous (Beskides, south and south-east of Lublin, in green) or Tertiary (Polish Carpathians). The areas of the Southern Poland are much more favourable to the truffles than those of the great plain.

CONCLUSION

The possibilities of cultivation in Europe are therefore enormous, the limiting factor not being the soil but the climate (considerable heat in summer, summer drought, and severe cold in winter). Preempting the cold, the heat, drought is possible by adaptive cultivation methods (in depth work of the soil) and the temporary cover of the soil (mulching). The damage caused by the drought can also be mitigated by a controlled irrigation.

REFERENCES

- Bencivenga M. 2008. La coltivazione dei tartufi in Italia. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde: 125–134. Brive.
- Bratek Z. 2008. Truffe et plantations à vocation truffière en Hongrie. (In:) Le Causse corrézien (eds.). La culture de la truffe dans le monde, Brive: 95–109.
- Bratek Z., Merenyi Z., Illies Z., Laslo P., Anton A., Papp L., Merkl O., Garay J., Vikor J., Brandt S. 2010. Studies on the ecophysiology of *Tuber aestivum* populations in the Carpatho-Pannonian region. Österr. Z. Pilzk. 19: 221–226.
- Chevalier G. 2003. Aquitaine: des truffes dans le Limousin! Le Trufficulteur français 43: 9.
- Chevalier G. 2008. La trufficulture en France. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde, Brive: 59–77.
- Chevalier G., 2010a. La truffe d' Europe (*Tuber aestivum*): limites géographiques, écologie et culture. Österr. Z. Pilzk. 19: 249–259.
- Chevalier G. 2010b. La M.R.T. (méthode raisonnée de trufficulture). (In:) Office de tourisme de Sarlat (eds). Les nouvelles techniques de culture de la truffe: 55–67. Sarlat.
- Chevalier G. 2011. Le calcium, clé de la production de *Tuber aestivum/uncinatum*. (In:) Truffe 54 Lorraine (eds). Proc. 3d congress of the European scientific group *Tuber aestivum/T. uncinatum* (T.A.U.E.S.G.), Nancy, Nov. 7th 2011 (in press).
- Chevalier G., Frochot H. 1997. La truffe de Bourgogne (*Tuber uncinatum* Chat.): histoire, biologie, écologie, culture, récolte, gastronomie. Pétrarque, Levallois-Perret.
- Chevalier G., Palenzona M. 2011. Truffles et trufficulture en Europe. (In:) Comunità Montana dei Monti Martani e del Serano (eds). Proc. 3d Intern. Congr. on Truffle, Spoleto: 65–72.
- Chevalier G., Desmas C., Rioussel L.G. 1979. L' espèce *Tuber aestivum* Vitt. II. Ecologie. Mushr. Sc. 10 (1): 977–993.
- De Miguel A., Reyna S., Saez T., Palazon C., 2008. La trufficulture en Espagne. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde: 45–58. Brive.
- French M.A. 2008. Le développement du marché truffier en Grande-Bretagne. (In:) Le Causse corrézien (eds) : La culture de la truffe dans le monde: 79–93. Brive.
- Gažo J., Miko M. 2008. History and perspectives of economical use of the Burgundy truffles (*Tuber aestivum* Vitt.) in Slovak Republic. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde: Brive: 173–182.
- Gažo J., Miko M. 2010. Truffle habitat in western Slovakia. Österr. Z. Pilzk. 19: 245–247.
- Granetti B., De Angelis A., Materozzi G. 2005. Umbria, terra di tartufi. Regione Umbria, Terni.
- Grebenc, T., Kraigher H., Martin MP., Piltaver A., Ratosa I. 2008. Research and cultivation of truffle in Slovenia – current status. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde, Brive: 183–191.
- Gregori G. 1991. Tartufi e tartificoltura nel Veneto. Assessorato Agricoltura e Foreste, Padova.
- Gregori G. 2010. L' espèce *Tuber uncinatum* en Italie : écologie, commercialisation et valorisation. Österr. Z. Pilzk. 19: 265–271.
- Groux M., Keller J., 2008. La truffe en Suisse. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde, Brive: 209–217.

- Hilszczańska D., Sierota Z. 2010. First attempts towards cultivation of *Tuber aestivum* in Poland. Österr. Z. Pilzk. 19: 209–212.
- Honrubia M., Alfaro R., Fernandez A., Suz L.M., Morte A. 2011. Location and ecological characterization of natural truffle grounds in the region of Murcia (South East of Spain). (In:) Comunita Montana dei Monti Martani e del Serano (eds). Proc. 3d Intern. Congr. on Truffle, Spoleto: 189.
- Lawrynowicz M. 2011. Hypogeous fungi in the anthropogenic sites in Poland. (In:) Comunita Montana dei Monti Martani e del Serano (eds). Proc. 3d Intern. Congr. on Truffle, Spoleto: 166–172.
- Marjanovic Z. 2008. Truffles and possibilities for their cultivation in Serbia- current situation. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde, Brive: 163–172.
- Mathieu C. 2009. Les principaux sols du monde . Voyage à travers l' épiderme vivant de la planète terre. Tec & Doc, Lavoisier, Paris.
- Raglione M., Lorenzini P., Malgorzata O., Bonifazi A. 2011. A contribution to the characterization of the soils suitable for *Tuber melanosporum* and *T. aestivum* growth through mineralogical analysis of clay fraction. (In:) Comunita Montanadei Monti Martani e del Serano (eds). Proc. 3d Intern. Congr. on Truffle, Spoleto: 147–151.
- Urban A., Pla T. 2008. Truffles and truffle cultivation in Austria. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde, Brive: 19–34.
- Wedén C., Danell E. 2010. Truffle cultivation in Sweden. (In:) Le Causse corrézien (eds). La culture de la truffe dans le monde, Brive: 193–207.
- Wedén C., Chevalier G., Danell E. 2004. *Tuber aestivum* (syn.*T. uncinatum*) biotopes end their history on Gotland, Sweden. Mycol. Res. 108: 304–310.
- Zambonelli A., Di Munno R. 1992. Indagine sulla possibilità di diffusione dei rimboschimenti con specie tartufigene: aspetti tecnico-colturali and economici. Ecoplanning.