

OCCURRENCE OF *GEOGLOSSUM*, *TRICHOGLOSSUM* AND *MICROGLOSSUM* (*Ascomycota*, *Leotiales*) IN FINLAND

Esteri OHENOJA

Botanical Museum, University of Oulu

FIN-90570 Oulu, Finland

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KEY-WORDS : *Geoglossum*, *Trichoglossum*, *Microglossum*, Finland, Distribution, Ecology, Phenology

ABSTRACT : Nine species of the genus *Geoglossum*, one species of *Trichoglossum* and three of *Microglossum* have been presented and their distribution in Finland has been mapped. *G. cookeianum*, *G. fallax*, *G. starbaeckii* and *Microglossum olivaceum* are nationally vulnerable in Finland, *G. atropurpureum*, *G. umbratile* and *Trichoglossum hirsutum* are care-demanding and *G. glutinosum* is considered locally threatened.

RESUME : (*Venue des Geoglossum, Trichoglossum et Microglossum (Ascomycotina, Leotiales) en Finlande.*) Neuf espèces du genre *Geoglossum*, une de *Trichoglossum* et trois de *Microglossum* sont présentées et leur répartition en Finlande est cartographiée. *G. cookeianum*, *G. fallax*, *G. starbaeckii* et *Microglossum olivaceum* sont vulnérables au niveau national, en Finlande, *G. atropurpureum*, *G. umbratile* et *Trichoglossum hirsutum* demandent une attention conservatoire et *G. glutinosum* est considéré comme menacé localement (traduit par la rédaction).

INTRODUCTION :

The species of *Geoglossum*, *Microglossum* and *Trichoglossum* are regarded as saprophytic Ascomycetes growing in light grassy forests, herb-rich forests, on pastures, ditch banks and meadows, along roads and rivers and some on bogs. Many finds have been made in Finland from calcareous areas (Vauras 1991), but the species are not especially calciphiles. On calcareous ground there often occur dry meadows and open rich forests which are convenient for the earth tongues. But many northernmost populations may benefit from the calcareous ground.

Observation of earth tongues is often difficult, but their occurrence can also be very variable and they do not grow fruit-bodies every season or they are very small and invisible. The possibility of finding earth tongues in Finland falls into the weeks between July and October (Fig. 9).

In Finland thirteen species of earth tongues have been found. None of them are very common and they do not occur regularly. Only *G.sphagnophilum* is a species which can be found in almost every season somewhere, because it grows on bogs. The species growing on litter and humus are more sensitive to drought. Published records about these fungi are mainly keys presented by Ulvinen & Ohenoja (1976), Ohenoja (1995) and by Ohenoja in the forth-coming Nordic Macromycetes, Vol. 1. Kallio & Heikkilä (1963) and M. Eriksson (1964) deal with *G.arenarium* on sand dunes.

Good seasons are rare :

There are in the herbaria some Finnish specimens from the last century, from the years 1848-1892, many of them being taken in the year 1866, which might have been a good year for this group. The oldest find is from the year 1848, made by Falck from Tampere. Most specimens have been collected by P.A.Karsten, but also Furuhjelm, Hisinger, Hult, Kihlman, Lindberg, and Lönnbohm have found these fungi.

In the first half of the 20th century the earth tongue collections increased slowly, the collectors being Kyllikki Alava, Lars Fagerström, Väinö Heikinheimo, Ernst Häyrén, J.I. Liro & H. Roivainen, Nicken Malmström, Göran Stenlid, Arvi Ulvinen, Akseli Valta and I. Välikangas. Later the years 1966, 1970, 1972, 1974, 1977 to 1979, and especially the season 1981 have been good, at least according to the collections of the Finnish herbaria. There are also several finds from the seasons 1985, 1988, 1989 and 1992. The distribution maps do not show yet real occurrence of these fungi but merely localities which researchers have visited, e.g. Reima Saarenoksa in Uusimaa, around Helsinki, P.A. Karsten, Pirkko Askola, Veli Haikonen and Unto Söderholm in South Häme, and Ulla Nummela-Salo, Pertti Salo and others in northern Finland.

Earth tongues found in Finland :

There grow in Finland at least nine species of *Geoglossum*, one of *Trichoglossum* and three species of *Microglossum* (Figs. 1-8). Nannfeldt (1942), Hakelier (1964) and Nitare & Ryman (1984) have recorded from Sweden about twenty species belonging to these three genera, but e.g. Nitare has observed in his studies the large variability of fruit bodies and their anatomy in different stages and come to the opinion that there are maybe too many described taxa.

Identification of earth tongues is seldom possible by the habitus of fruit-bodies and microscopical studies are in many cases necessary. But there are still taxonomic problems among these fungi and DNA analyses and laboratory cultivation tests are needed. In the following the species have been grouped, however, according to macroscopic characteristics.

The occurrence of the species in other Nordic countries can be seen in the forth-coming volume of Nordic Macromycetes. In all 200 specimens from the herbaria H, JYV, KUO, OULU, TUR, TURA, and UPS have been studied. Lists of the specimens are preserved as a manuscript at the Botanical Museum of the University of Oulu.

DESCRIPTION OF THE SPECIES :

A. Fruit bodies black and dry, stem covered by tufts ; spores hyaline

A.1. *Fruit bodies variable in form, mostly thick and low ; grows on dunes and in other sandy areas.*

1. *Geoglossum arenarium* (Rostr.) Lloyd (= *Corynetes arenarius*)

Black, dry, stem very short, covered with tufts. Asci 130-160 x 10-12 μm , spores 25-40 x 4-6 μm , hyaline, one-celled, paraphyses brown, but not gelatinized, tips enlarged. On dunes and in other large sandy areas, associated with *Empetrum nigrum* and *Clavaria argillacea*. Abundant in autumn-late autumn in many localities on the shores of the Gulf of Bothnia, found also from eastern Finland (Koillismaa) and northernmost Finland (Utsjoki), from biological provinces V, U, St, KP, OP, Ks, and InL.

A.2. *Fruit bodies slender, tall ; grows on forest meadows.*

2. *Geoglossum atropurpureum* (Batsch : Fr.) Pers. (= *Thuemenidium a.*)

Fruit body tall, purplish black, stem covered by tufts. Asci 100-120 x 10-12 μm , spores hyaline, 20-35 x 5-6 μm , 2-6 septate, paraphyses long, surrounded by brown mass. On meadows and in grassy forests. Autumn, rare in Finland, in A, V, U, EH, and PeP.

B. Black or brownish black, sometimes with a lilac tint, stem covered by tufts ; spores brown. Grows in rich grassy forests, on meadows, along roads.

B.1. *Hymenium black, stem brownish black, paraphyses surrounded by brown mass.*

3. *Geoglossum fallax* Durand coll.

Brownish black, stem dry or slightly viscid, covered by tufts ; spores tardily ripening, paraphyses agglutinated. There is much variation inside this taxon and two different forms (or real species?) can be separated. One has short spores, 45-60 x 5-5.5 μm in size, with 7-11-septa, and another long spores, 65-80 x 5-6 μm in size, 7-14-septated. Paraphyses are in the former taxon brownish, thick-walled and the tips often rather narrow, and in the latter taxon paler and broadened at the tips. These specimens are also sometimes viscid. Grows in grassy and mossy forests, on dry meadows, roadsides and paths. Not very rare, but most finds from southern and central Finland, in the biological provinces A, V, U, EH, KP, OP, PeP, and KiL.

Nannfeldt (1942) described also the species *G. vleugelianum*, which is, however, taxonomically problematic. E.g. Nitare has observed characteristics given by Nannfeldt also in *G. fallax* and *G. starbaeckii*. See also Spooner (1987).

B.2. *Hymenium and stem black, paraphyses brown, not agglutinated*

4. *Geoglossum starbaeckii* Nannfeldt

Fruit body black, stem covered by small tufts, paraphyses slender, brown, free, tips

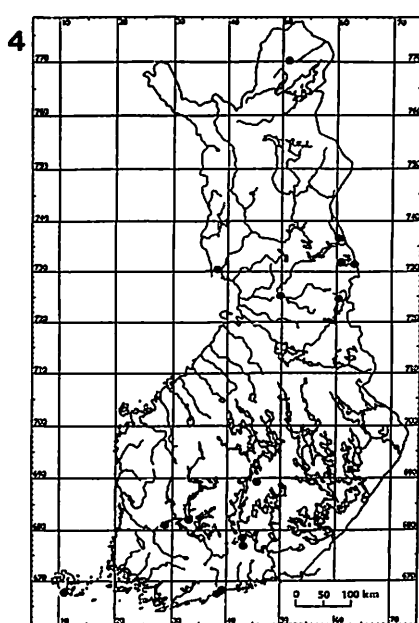
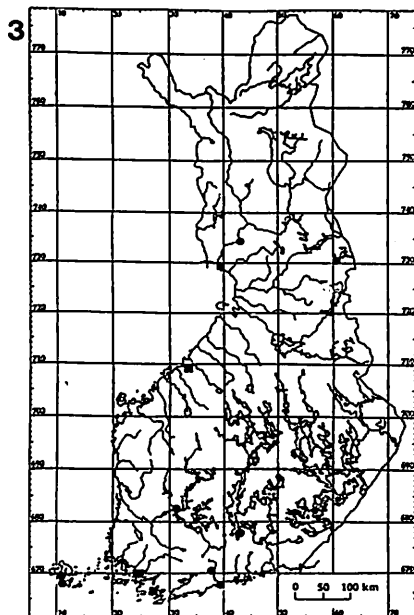
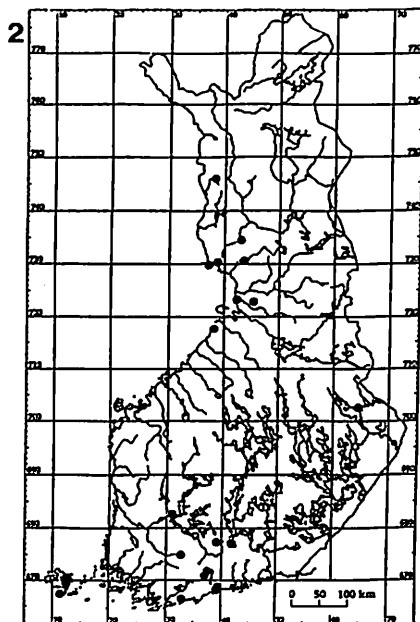
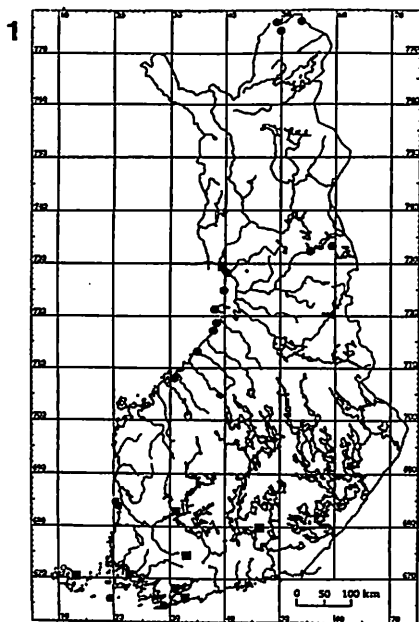


Fig.1. Finds of *Geoglossum arenarium* ● and *G.atropurpureum* ■ in Finland.

Fig.2. Finds of *Geoglossum fallax* coll. in Finland.

Fig.3. Finds of *Geoglossum starbaeckii* ● and *G.cookeianum* ■ in Finland.

Fig.4. Finds of *G.umbratile* in Finland.

narrow ; spores often 7-septate, 65-85 x 5-6 μm in size. Grows in herb-rich grassy forests and parks and on forest meadows and pastures. More rare than *G.fallax*, found in southern and central Finland. A, U, EH, PeP, Ks.

C. Stem quite glabrous, fruit body black

C.1. *Fruit body long and slender, 4-5 upper cells of paraphyses rounded, dark brown, cell walls constricted*

5. *Geoglossum cookeianum* Nannfeld

Fruit body long and slender, black, stem almost glabrous, brownish black, covered with brown hairs at the base. Asci 150-180-210 x 16-18-20 μm , spores 65-80 x 5-7 μm in size, dark brown, tardily ripening, paraphyses agglutinated, uppermost 4-5 cells rounded, thick-walled, dark brown, cell walls constricted.

Very rare in Finland ; there are only two finds from calcareous areas (biological provinces V and KP). The fruit bodies grew in the northern locality (Kälviä) on a big mossy rock.

C.2. *Fruit bodies small, asci 4-6-spored, paraphyses curved or coiled.*

6. *Geoglossum montanum* Nannfeld

Fruit bodies small, black, stem glabrous. Asci 4-6-spored, 120-150 x 14-20 μm , spores 7-septate, 50-70 x 5-7 μm , paraphyses slender, brown, tip cells curved or coiled. Grows along paths, on sandy roadsides. A northern, possibly rather rare species, found in the biological province Koillismaa (Ks).

C.3. *Fruit body small, tip cells of paraphyses pale, slightly curved and clavate.*

7. *Geoglossum umbratile* Saccardo (= *G.nigratum*)

Fruit body black, small, slender, stem glabrous. Asci 150-175 x 18 μm , spores 7-septate, fuliginous, 60-85 x 4.5-7 μm , paraphyses pale, slender, tip cells somewhat clavate and curved, cell walls not constricted. Grows on meadows and paths, often on bare soil. Rare in whole country, A, U, St, EH, PH, Kn, OP, PeP, Ks, InL.

D. Fruit bodies viscid or slimy, blackish brown.

8. *Geoglossum glutinosum* Pers. : Fr.

Fruit bodies viscid or slimy, blackish brown. Asci long, up to 250 μm in size, spores 70-75 x 4.5-6 μm , up to 7-septate, tip cells of paraphyses brown, of the shape of almond. Grows in rich deciduous forests, on meadows and paths, often on bare soil or sand. Rare in southern and Central Finland, V, U, EH, PK, OP, PeP.

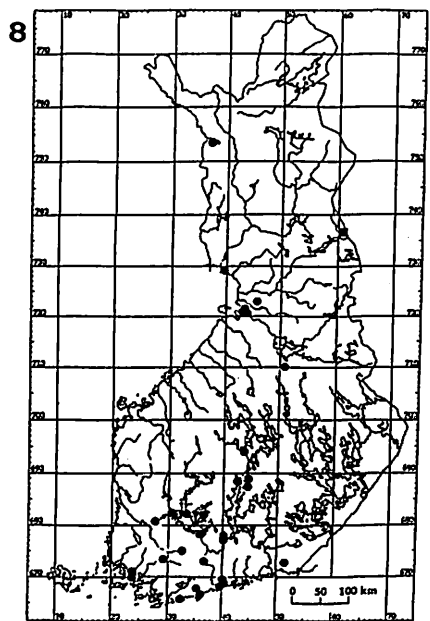
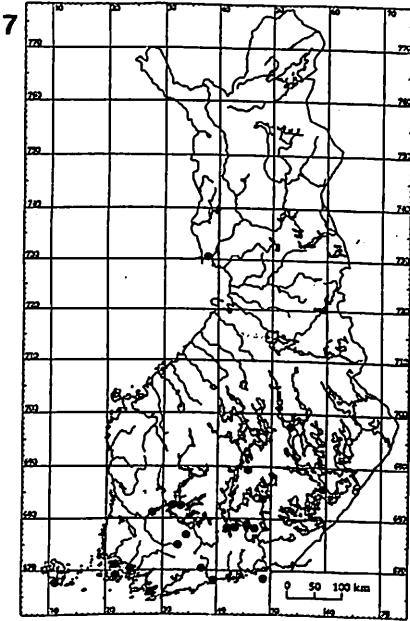
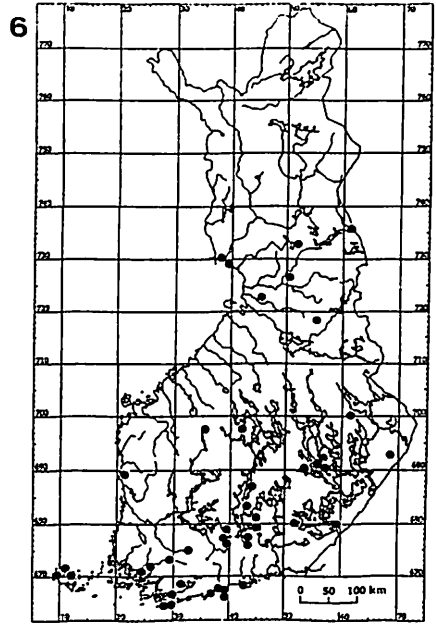
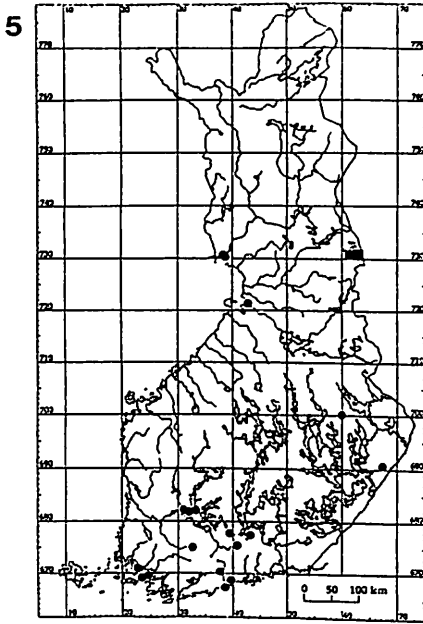


Fig.5. Finds of *Geoglossum montanum* ■ and *G. glutinosum* ● in Finland.

Fig.6. Finds of *Geoglossum sphagnophilum* in Finland.

Fig.7. Finds of *Trichoglossum hirsutum* in Finland.

Fig.8. Finds of *Microglossum viride* ●, *M. olivaceum* ■, *M. fuscorubens* □ in Finland.

E. Grows on bogs, fertile part of the fruit body short and broad.

9. *Geoglossum sphagnophilum* Ehrenb. (= *G. glabrum*)

Fruit body black, fertile part glossy, short, spatulate and broad, stem glabrous. Asci 150-180 x 18-22 μm , spores 65-80 x 6-8 μm , 7-septate, fuliginous, paraphyses agglutinated, tip cell roundish-clavate, up to 15 μm broad. Cell walls of lower cells of paraphyses constricted. Grows in bogs along the shores etc. associated with *Sphagnum*. Quite common in southern and central Finland, found in A, V, U, EH, ES, EP, PH, PS, PK, Kn, KP, OP, PeP, and Ks.

F. Stem velvety, covered with dark brown setae.

10. *Trichoglossum hirsutum* (Pers.: Fr.) Boudier

Fruit body blackish brown, matt, stem black, velvety, covered with brown setae; spores 110-130 x 5-6 μm , up to 14-septate. Grows on dry meadows and in forest meadows. Rare in southern and central Finland, found in A, V, U, St, EH, ES, PH, PS, and PeP.

G. Fruit bodies green, spores hyaline, tips of paraphyses slightly clavate.

11. *Microglossum viride* (Pers.: Fr.) Gillet

Fruit bodies yellowish or dark green, 2-5 cm high, fertile part short and thick, limit to the stem distinct, stem matt, covered with small tufts (rests of the veil). Asci 110-130 x 9-10.5 μm , spores 16-22 x 5-6 μm , 3-4-septate. Grows along moist brookshores and in deciduous forests. Not very common in Finland, found in V, EK, U, St, EH, PH, Kn, OP, PeP, KiL.

12. *Microglossum olivaceum* (Pers.: Fr.) Gillet

Fruit bodies brownish green, olivaceous, stem almost glabrous. Asci 85-95 x 7.5-8.5 μm , spores 12.5-17 x 3.5-5 μm . Grows in parks and pastured forests. Very rare, found in Ks (Rassi et al. 1986). The author was not able to find the specimen in H.

13. *Microglossum fuscorubens* Boudier

Fruit bodies purplish brown, resembling much *G. atropurpureum*, but with smaller, ellipsoid spores, less than 20 μm in size. Found in Finland from one locality in South Häme (EH) from a dry meadow on an esker.

ECOLOGY :

On many habitats of earth tongues grow several species of these genera, as also Nitare & Ryman (1984) have observed in Sweden. Other associated fungi have been *Clavulinopsis corniculata*, *Camarophyllus pratensis* and *C. niveus*, many *Hygrocybe* and *Entoloma* species and *Lepiota clypeolaria*.

ENDANGERED EARTH TONGUES :

Several earth tongues are declining and thus endangered in Europe (Table 1) and also in Finland some of them have been taken into the red book (Rassi & al. 1992). Especially in Sweden these fungi have been observed to be declining (Hakelier 1964, Nitare 1988). In Finland in all four species are nationally vulnerable and three of them care-demanding (Table 1) and one is kept locally endangered. The categories given to those species have been adopted often without much knowledge of their occurrence and some of them will possibly be changed in the next edition of the red book of Finland.

The main reasons for the decline of these fungi are the changing of the use of the land, especially the agriculture. The meadows, ditch banks and pastured forests have decreased since the fifties, the roadsides and paths have become bushy and grassy or built into broad roads, which are not suitable habitats for earth tongues. Some earth tongues (*G. arenarium*, *G. sphagnophilum*, *Microglossum viride*) can live only in very natural environments, and they are suffering from human management. Instead many species have benefitted from the activity of man and lived successful periods, but their occurrence and role in the natural habitats is less visible and difficult to imagine without a long-lasting study. However, researchers should also be careful and not damage habitats nor the mycelia of earth tongues by extensive or indelicate collection.

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Table 1. Endangeredness of some species of *Geoglossaceae* in the European countries.
1 : very endangered ; 2 : vulnerable ; 3-4 : care-demanding ; * : locally threatened

	SF	S	N	Dk	GB	RU	D	A	Cz	P
<i>Geoglossum cookeianum</i>	2	-	3	-	-	3	2	-	-	-
<i>Geoglossum fallax</i>	2	-	-	-	-	3	2	-	-	-
<i>Geoglossum starbaeckii</i>	2	-	-	-	2	-	2	-	-	-
<i>Microglossum olivaceum</i>	2	4	2	2	2	1	2	4	-	-
<i>G. atropurpureum</i>	3	4	4	2	3	1	1	3	-	-
<i>Geoglossum umbratile</i>	3	-	-	-	-	-	-	-	-	-
<i>Trichoglossum hirsutum</i>	3	-	-	-	-	3	2	3	-	1
<i>Geoglossum glutinosum</i>	*	-	-	-	-	3	2	3	-	-

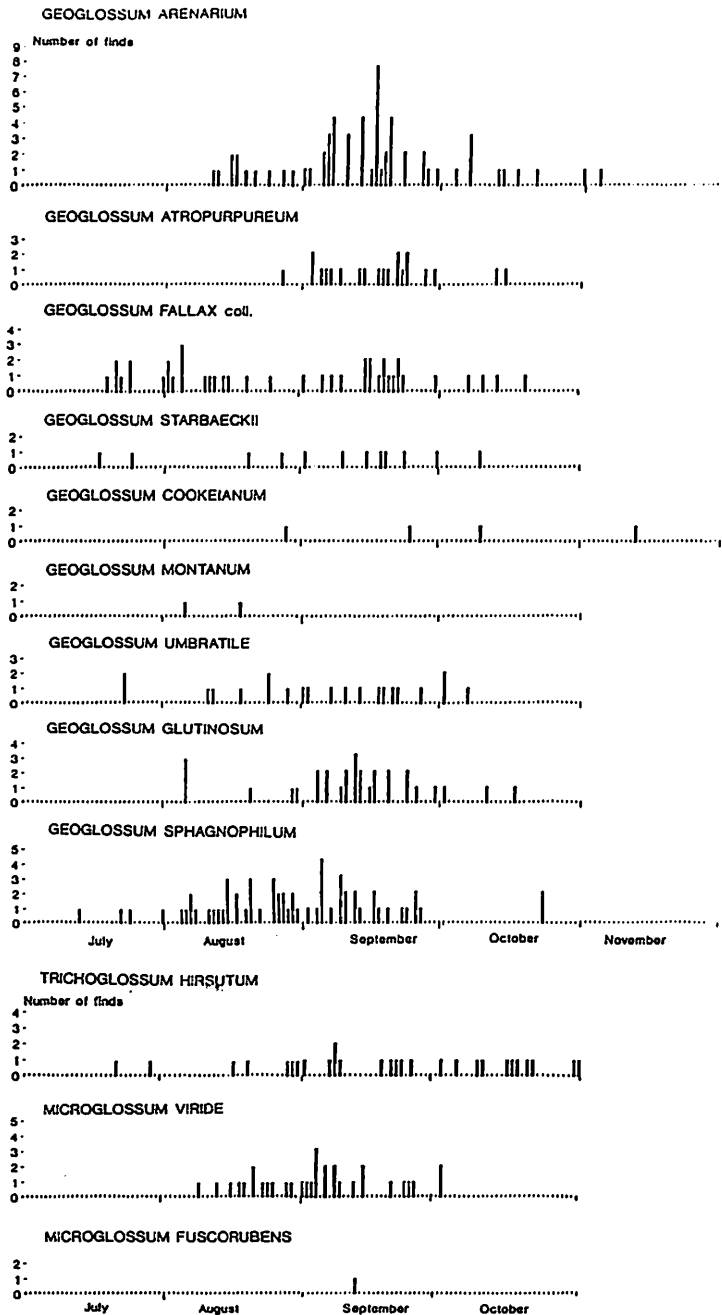


Fig.9. Phenology of the studied earth tongues according to the herbarium specimens.