Avena strigosa — a disappearing synanthropic species in Czechoslovakia

**Zdeněk Kropáč**


A survey is given of the taxonomic problems, geographical distribution, man’s role in spreading, and historical aspects of *Avena strigosa* Schreb. s. ampl. The distribution of *A. strigosa* Schreb. s. str. in Czechoslovakia is shown in a cartogram backed by the list of localities. *A. strigosa* is an old ergasiolipophyte (sensu Thellung) which was cultivated in Czechoslovak territory in the past and became here also a weed. However, its present occurrence is quite limited and the species is practically on the verge of extinction.

*Botanical Institute, Czechoslovak Academy of Sciences, 252 43 Průhonice, Czechoslovakia.*

**INTRODUCTION**

The genus *Avena* L. is represented in the Flora of Czechoslovakia (Dostál et al. 1950 : 2017—2020) by five species, of which *A. sativa* L. is known as a cultivated plant and *A. fatua* L. is a widely distributed weed, whereas *A. nuda* (L.) Hoej er and *A. sterilis* L. are noted as casual aliens only. *A. strigosa* Schreb. is there characterized by the words “native in western Europe”, and “in the past frequently cultivated in mountainous regions, at present a weed plant in western and south-western Moravia and in Silesia only” (Dostál et al., l.c.). The latter statement was probably based on earlier floras and floristic contributions published e.g. by Čelakovský (1868, 1888, 1889, 1891), Oborný (1883), Formánek (1887), Laus (1908), Podpěra (1925), and perhaps by others. The present situation has markedly changed, and *A. strigosa* does not play any role either as a cultivated plant or as a weed. Nevertheless, it is an interesting synanthropic plant, an ergasiolipophyte sensu Thellung (in Naegele et Thellung 1905 : 233), for which suitable conditions of subs spontaneous spreading have evidently ceased to exist in Czechoslovakia. This fact of itself is quite interesting from the viewpoint of various types and stages of naturalization of introduced plants. In general, it is well known that some synanthropic plants are extending, while others are diminishing their areas (cf. e.g. Salisbury 1961), however, the bio-ecological mechanism of this phenomenon has not so far been thoroughly studied. Another species, *Avena fatua*, when compared with *A. strigosa*, is very well naturalized on arable land in Czechoslovakia, and continues to spread (Kropáč 1980). *A. strigosa* should, however, also evoke our interest from the viewpoint of the threatened taxa of the flora of Czech Socialist Republic (Holub et al. 1979); it was not included in this first draft of the “Red list” of plants — perhaps owing to its supposed sowings.
TAXONOMIC PROBLEMS IN AVENA STRIGOSA S. AMPL. AND Distinguishing of Some Related Taxa

As to the morphological characters, A. strigosa Schreb. differs markedly from the other species of Avena contained in the Flora of Czechoslovakia (Dostál et al. 1950). The main difference is in the lemma tips which are biaristulate when compared with the other species which have lemma tips bidenticulate (see Fig. 1). This conspicuous morphological character was previously applied in the taxonomic study by Mal'cev (1930) who distinguished in the section Euavena Griseb. the subsections Aristulatae and Denticulatae. The concept of A. strigosa Schreb. s. ampl. by Mal'cev (op. cit., p. 243–286) as well as earlier by Thellung (1911) was very broad indeed; altogether eight infraspecific taxa were recognized, of which six at the level of subspecies (subsp. hirtula (Lagasca) Malz., subsp. strigosa (Schreb.) Thell., subsp. barbata (Pott) Thell., subsp. viestii (Steudel) Thell., subsp. vaviloviana Malz., and subsp. abyssinica (Hochst.) Thell.), and two at the level of proles (prol. brevis (Roth) Thell., and prol. nuda (L.) Hausskn.). Nowadays, many of these taxa are classified at the level of species, in some cases grouped even in different sections. In the recently published monograph by Baum (1977), A. strigosa Schreb. s. str. is placed in the section Agraria (Baum 1975) together with A. brevis Roth, A. hispanica Ard., and A. nuda L. This section suggests some relationships with the section Tenuicarpa (Baum 1975) which comprises, however, all the species with spikelets disarticulating at maturity. On the contrary, all the species included in the section Agraria have a “cultivated base of spikelets” (see Baum 1977: 162), i.e. their florets in spikelets do not disarticulate at maturity, which indicates that these species were sown as cereal crops. Similar differences are well-known in other pairs or groups of Avena species, which found its expression as early as in the first classification by Cosson (1854) who distinguished two subsections in the genus Avena: Sativae and Agrestes. According to Mal’cev’s concept (1930, l.c.) A. strigosa Schreb. s. ampl. comprises also some species of the Baum’s section Tenuicarpa at the level of subspecies, viz. A. barbata Pott ex Link, A. hirtula Lag., A. viestii Steudel. Moreover,

Fig. 1. — Various shapes of lemma tips in Avena spp. (only the prevailing forms schematically illustrated): a — bidenticulate, b — bisubulate, c — biaristulate, d — bisetulate-biaristulate.
A. abyssinica Hochst. and A. vaviloviana (MALZ.) MORDV. were also placed here as subspecies, though BAUM (1977) placed both these species in his section *Ethiopica* (BAUM 1975). This broad species concept of MAL'CEV (1930) had, of course, some advantage for numerous taxa could be arranged into distinct types according to the supposed Vavilovian centres of evolution.

Another system of the species *A. strigosa* s. ampl. presented by MANSFELD (1959) and JANCHEM (1960) was applied in the "Exkursionsflora" by ROTH-MALER et al. (1976: 725). *A. nuda* L. em. MANSF. comprises here three subspecies: subsp. *nuda* ( = *A. nuda* L.), subsp. *strigosa* (SCHREB.) JANCHEM ( = *A. strigosa* SCHREB.), and subsp. *brevis* (Roth) MANSF. ( = *A. brevis* Roth).

BAUM (1977), employing a whole complex of morphological as well as micromorphological characters distinguished all the last-mentioned taxa at the rank of species. Additionally, he re-established *A. hispanica* ARD., which is the closest related taxon to *A. strigosa* SCHREB., as a species. Among the characters for the discrimination of cat species, BAUM (op. cit.) stressed

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**Fig. 2.** — Species characters in the section *Agraria* BAUM (lemmas and awns of the first floret): 
a, b — *Avena brevis* (two different forms), c — *A. nuda*, d — *A. hispanica*, e — *A. strigosa*.

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**Fig. 3.** — Various types of lodicule pairs in *Avena* spp.: a — *fatua* type, b — *sativa* type, c — *strigosa* type. Note the arrows indicating the typical side lobes and their position. (Wing-like appendages attached to the cylindrical lower part of the lodicule base are not relevant).
especially the following ones: lodicule type, epiblast type and size, a new
definition of the components of lemma tip (for further see Fig. 1), place of
insertion of the awn and vestiture of lemma below the insertion of the awn,
and among the characters not relevant to this paper, e.g. shape of the awn
and relative size of periphery ring (at disarticulating species), etc. For the
discrimination of related species in the section Agraria BAUM, see Tab. 1
and Figs. 2 and 3.

Nevertheless, Ladizinsky and Zohary (1971) have recently again published the concept
of one "biological species" A. striigosa. Here, it may be emphasized that all the species of
the section Agraria are diploid (2n = 14), whereas the species of the section Ethiopica
are tetraploid (2n = 28), and in the section Tenuicarpa diploids prevail, only A. barbata
and some forms of A. wiestii being tetraploid. Crossings among the species of section Agraria can readily be made,
whereas crossings between A. striigosa s. str. and A. barbata are somewhat difficult (cf. Mal'cev
1930). It is worth mentioning that all species of the section Avena (as circumscribed by Baum
1975), where among others A. fatua, A. sativa, and A. sterilis belong, are hexaploid (2n = 42).

GEOGRAPHICAL DISTRIBUTION, ITS HISTORICAL ASPECTS,
AND ORIGIN OF AVENA STRIGOSA

The dot cartogram of the world distribution of section Agraria, published
by Baum (1977 : 162), demonstrates that the distribution area of this section
is mainly Atlantic Europe and the Canary Islands, between 25° and 65° N.
From the cartograms of individual species in Baum (op. c.) it can be derived
that localities of A. striigosa s. str. are accumulated in north-western Europe,
while localities of A. hispanica are confined to the south-western Europe,
especially to Portugal, north-western Spain, and south-western France.
A. striigosa s. str. is reported from 18 countries; especially frequent occurrences
are known from the United Kingdom, Belgium, northern and north-western France,
western and north-western Federal Republic of Germany, Switzerland,
Luxemburg, Denmark, and southern Sweden, followed by these countries:
Portugal, Spain, Norway, Finland, German Democratic Republic,
Czechoslovakia, Austria, Poland, Hungary, USSR (Lithuanian SSR,
Latvian SSR, Russian SSR, Byelorussian SSR, Ukrainian SSR), and
Corse (France). A detailed survey of the distribution in the individual
districts in France is contained in the cartogram by Barralis (1961), and
from Denmark in the cartogram by Petersen et Odgaard (see in Bachthaler
1975). The distribution in Norway is referred to by Korsmo (1930),
in Austria by Janchen (1960), and in Belgium by Stryckers et Pattou
(1963). Mal'cev (1930) listed many localities from north-western USSR,
Rožević in Keller et al. (1934, 1 : 204) pointed out frequent occurrence
on sandy soils of the Byelorussian SSR, whereas in the Ukrainian SSR
A. striigosa was referred to as a rare plant in cultivated oats (see Klokov in

In the past, A. nuda was also grown to a larger extent mainly in Germany, Belgium,
and United Kingdom (Mal'cev 1930, Baum 1977), and probably to a small extent in Bohemia
(Berchtold et Seidl 1836 : 177, Čelakovský 1868 : 40, Maloch 1913 : 130), Moravia (Oborny
1883 : 134, Formánek 1887 : 106), and in Slovakia (Neilreich 1886, 2 : 18; Sagorski in Sago-
ský et Schneider 1891, 2 : 538). Domín cited in his manuscript (Domín et al. 1953) Flei-
ischer's remark that A. nuda had empirically been sown not far from the town of Litomyšl
in 1895, but without any good results. Domín (op. c.) summarized in his manuscript that A. nuda
was sown in Bohemia very rarely and noted also some ephemeral occurrences on arable land.
A. brevis was once cultivated in western Europe and also introduced to some parts of the Euro-
Siberian region (Mal'cev 1930, Baum 1977). Some indications of its occurrence as a weed in
<table>
<thead>
<tr>
<th>Character</th>
<th>A. brevis</th>
<th>A. nuda</th>
<th>A. hispanica</th>
<th>A. strigosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height of plants</td>
<td>relatively low (40–70 cm)</td>
<td>relatively low (60–80 cm)</td>
<td>relatively tall (70–110 cm)</td>
<td>relatively tall (80–120 cm)</td>
</tr>
<tr>
<td>Shape of panicle</td>
<td>slightly flagged</td>
<td>slightly flagged</td>
<td>equilateral</td>
<td>equilateral</td>
</tr>
<tr>
<td>Length of spikelet (without awns)</td>
<td>short, 10–15 mm</td>
<td>long, 20–28 mm</td>
<td>short, 13–24 mm (variable in shape)</td>
<td>relatively short, 20–25 mm</td>
</tr>
<tr>
<td>Number of florets</td>
<td>(1) – 2 – 3</td>
<td>3–6</td>
<td>2</td>
<td>2–3</td>
</tr>
<tr>
<td>Length of glumes and their state</td>
<td>10–16 mm nearly equal tough</td>
<td>20–22 mm slightly unequal resembling glumes</td>
<td>12–20 mm nearly equal tough</td>
<td>16–24 mm nearly equal tough</td>
</tr>
<tr>
<td>Lemma structure</td>
<td>shortly biaristulate-bisetulate to quadri-mucronate (or shortly biaristulate-bilobed)</td>
<td>biaristulate (with a short and weak aristula) to bisubulate</td>
<td>bisetulate-biaristulate (sometimes biaristulate only)</td>
<td>bisetulate-biaristulate (sometimes biaristulate only)</td>
</tr>
<tr>
<td>Lemma tips</td>
<td>no macrohairs below the awn insertion (sometimes a few hairs only)</td>
<td>without macrohairs below the awn insertion</td>
<td>a few macrohairs around the awn insertion (but always absent below this insertion)</td>
<td>with macrohairs present or absent below the awn insertion</td>
</tr>
<tr>
<td>Vestiture of lemma</td>
<td>fatua type, small (about 0.5 mm long), ± triangular, never bearing prickles</td>
<td>strigosa type or fatua type</td>
<td>fatua type, but often with hydathodes and apex obtuse</td>
<td>strigosa type and often bearing prickles</td>
</tr>
<tr>
<td>Place of insertion of the awn</td>
<td>just below the tip of lemma</td>
<td>awnless or awns inserted at about middle of lemma</td>
<td>between upper 1/3 to 1/4 of lemma (rarely close to middle of lemma)</td>
<td>at about lower third of lemma</td>
</tr>
</tbody>
</table>

Note: All the species have epiblasts of "brevis type", 0.3 to 0.4 mm wide.
Czechoslovakia could be found at the beginning of the past century only (cf. ENDLICHER 1830:123, KOSTELZKY 1837:92). In Austria, its weedy occurrence in the past was reported from northern Burgenland by PILL (see in JANCHEK 1960:834). Nowadays, A. brevis is only rarely cultivated and occurs as a weed mainly in the Azores, the Canaries, Madeira, and Portugal (cf. BAUM 1977:164, and see also in MAL'ČEVE 1930:264).

Both of these species were not native to Czechoslovakia as supposed by BAUM (1977) who quoted for A. brevis (p. 167) as well as for A. nuda (p. 182) the locality “Tabor Bohemia Sloupnice”, legit FLEISCHER 1907 (PRC) et FLEISCHER 1909 (PRC), respectively. These herbarium labels were, however, headed “Hortus regiae academiae pro agricultura, Tabor-Bohemia”, and as a rule contained a remark “colui in horto meo — Sloupnice, Fleischer”. Evidently, such plants were not collected in a natural site, but they were introduced into the botanical garden of the Royal Czech Academy of Agriculture in Tábor (southern Bohemia)1) by professor Bukák and presumably cultivated also in some other gardens by Czech amateur botanists; among them vicar Fleischer in Sloupnice near Litomyšl (eastern Bohemia) played an important role. Similarly, various agricultural plants were cultivated by prof. Lause in the botanical garden of the Teachers' College in Olomouc (Moravia), and designated on the labels of herbarium specimens “Hortus botanicus Olomucensis”.

MAL’ČEV (1930, Fig. 65 on p. 418, and p. 423) supposed that the centre of origin of A. strigosa (incl. prol. brevis and prol. nuda, as well as the whole subsection Aristulatae) should be located in the north-western Pyrenees or, more generally, in the Atlantic Iberian peninsula, owing to the great diversity of taxa revealed here (see also BAUM 1977:162). On the contrary, Avena species of MAL’ČEV’s section Denticulatae, where among others A. fatua and A. sativa belong, are mainly of Central Asiatic origin. According to MAL’ČEV (op. c.), the wild-growing A. hirtula LAG. is supposed to be an ancestor of A. strigosa s. str., though other opinions ascribe this role to another wild-growing species, viz. A. barbata POTT ex LINK (HEGI et ZIMMERMANN 1936, BROUWER 1972); both species belong to BAUM’s section Tenuicarpa.

Archeological findings of oat grains in lake dwellings in Switzerland (HEER 1866) belong presumably to the species A. strigosa as demonstrated by MAL’ČEV (1930:416-423, and 499-500) and SINSKAJA (1969:392). According to these scientists and WERTH (sec. SINSKAJA, l.c.), the grains of A. strigosa are smaller and their lower end is pointed, so that they could be readily discriminated from A. fatua or A. sativa. The findings of A. strigosa are dated to the Bronze Age (i.e. ca. 2000 to 700 BC), whereas the remains of A. fatua, and partly of A. sativa, from various findings in Central Europe, could chiefly be referred to the Early Iron Age, especially to its Hallstadt period (i.e. ca. 700 to 400 BC). These facts support the contention that A. strigosa had been cultivated in Central Europe earlier than A. sativa and presumably had become also a component of the subs spontaneous flora earlier than A. fatua. In the Early Iron Age, A. sativa as well as A. fatua occurred presumably as weeds in the cultivated cereals of that period, such as wheat and barley, and most probably they had been spontaneously introduced with these cereals (DOMIN 1945). Only in the course of the development of early medieval agriculture were the qualities of the cultivated oat (A. sativa) recognized by the ancient Slavs, and later also by German tribes.

MAL’ČEV (1930:423-424, and 501) showed that A. strigosa (including prol. brevis and prol. nuda) belonged to the most ancient group of cultivated oats known already to the ancient Iberians and Basques, and partly to the Celts. He found in literature sources that A. strigosa,

1) In the years 1900—1919, this Academy named “Královská česká akademie hospodářská” was in fact the only Czech Agricultural University with a botanical garden of considerable importance (for further information see ŠETELOVÁ et al. 1977:182).
especially in proI. nuda, had commonly been cultivated in England as late as in sixteenth century (according to Rauus, Morison and others — see in Mal'cev, l.c.). Brouwer (1972: 391) showed that A. strigosa was grown on sandy soils with a rough climate, especially in the mountains, until mid-20th century, and enumerated countries of western Europe from Portugal and Spain across southern and western France and Belgium to England, Scotland, Ireland, the Shetlands and Orkneys, followed by the plains of north-western Germany, some higher elevations in the Schwarzwald Mts., and in the Mühltiertel of Austria. Present-day sowings are, according to Brouwer (l.c.), rarely dispersed mainly in Spain, Portugal, and Wales (here under the name “Ceirch Llwyd”). The same is referred to by Hubbard (1968) for mountain parts of Wales, Northern Scotland and Ireland. Some general indications on sowings of A. strigosa are contained in Hegi et Zimmermann (1936), whereas Korsmo (1930: 138) wrote about cultures in Denmark (Jütland). Nevertheless, as early as in the work of Zade (1918 : 305) it was stated that A. strigosa (incl. A. brevis and A. nuda) was not worth sowing even on poor, light soils, and Brouwer (1972: 391) wrote that “ihre Berechtigung als Kulturart zu gelten, hat die Art wegen der niedrigen Erträge weitgehend verloren”.

With regard to the above account of the diminishing role of A. strigosa as a cultivated plant, there arises its present-day role as a weed on sandy, poor soils in western and central Europe. It has become a rare plant which can be found in sowings of cultivated oat and rye, exceptionally also in waste places (Hegi et Zimmermann 1936, Hubbard 1968). Schubert et Mahn (1968: 286—287), in their detailed synthesis, could state A. strigosa only in the weed community “Teesdalio-Arnoseridetum, Rasse v. Setaria glauca”, which occurred on poor, sandy soils of the lowland “Dübener Heide” and of the “Flämig” in the German Democratic Republic. From the Gorce Mts. in Poland, Korňaš (1968) described a weed community “Geronio-Silenetum gallicae”, in which A. strigosa occurred sporadically at elevations 660 to 760 m. Also Warcholińska (1974, see Tabs. 7 and 20) indicated A. nuda as a rare weed from the Piotrków Plain (central Poland); she found this species in “Teesdalio-Arnoseridetum” (sowings of cultivated oat) and in “Spergulo-Lolietum remoti” (sowings of flax). Unfortunately, the taxonomic concept of A. nuda was not clear enough from the literature cited, most probably A. strigosa could be involved.

DISTRIBUTION OF Avena Strigosa s. str. in Czechoslovakia

The sources for the documentation of localities in the Czechoslovak territories were found (1) in the available herbarium specimens, (2) in all the available literature, above all of floristic character. For this purpose, the manuscript of Domín et al. (1953) containing data from various floristic papers and local floras also proved to be very useful. All specimens of the genus Avena L. s.l. deposited in twelve important Czechoslovak institutions were thoroughly revised and only records pertinent to A. strigosa were selected from the labels; the symbols of herbaria are quoted according to Ujcík et Houfüek (1970 : 3—4). The list of localities (see below) was compiled according to the phytogeographical regions and districts; for the territory of Bohemia and Moravia a new conception (Anon. 1977) and for the territory of Slovakia the earlier conception of Dostál (adopted by Futák in Futák et Domín 1960) were used. In the particular phytogeographical districts the localities are arranged from west to east, and the localities of the same longitude from north to south. In some herbarium labels the year of collection and/or name of the collector are missing; such data have either been omitted or, if desirable, denoted with “s.a.” (sine anno) and “s.auct.” (sine autore), respectively. Collectors are quoted mainly by the surname and
Fig. 4. — Distribution of *Avena strigosa* in Czechoslovakia represented by four fifty-year intervals.
abbreviations of the first name are used only to avoid possible confusion. The dot cartogram of distribution (see Fig. 4) was constructed on the basis of the following principles: (1) four fifty-year intervals from 1801 up to the present time are represented by different area of the particular “dot” (for further see explanation to Fig. 4), (2) if the same locality is indicated for different time intervals, only the more recent interval has been mapped, (3) in the case of accumulation of two or more localities in a small area, only localities distant at least 5 km from each other have been mapped. The following list comprises 108 localities, of which 104 could be shown in the cartogram. The largest number of localities is concentrated in the period 1851—1900 (70.4 %), whereas from the year 1951 up to the present time only a small percent of localities could be stated (6.5 %).

List of localities

A. Bohemia and Moravia

Thermophyticum

Terežinská kotlina
Předonín (Lichtnecker in Čelakovský 1888 : 638)

Džbán
Libušín (Lichtnecker in Čelakovský 1891 : 9), Švermov-Motýčin (ibidem), Kladno (ibid.), Kladno: prope odinam carboneam Amalia dictam (Lichtnecker et Wildt 1889, BRNM).

Středočeská tabule
Veltrusy (Polák 1878, PRC et Velenovský 1880, PRC), Štětí (Lichtnecker in Čelakovský 1888 : 638).

Český kras

Dolní Povltavi
Praha-Veleslavín (Opiz 1850, PR; etiam in Čelakovský 1868 : 40 et Čelakovský 1870 : 37).

Pražská plošina
Praha (Opiz 1847, PR), Praha (J. N. Bayer s. a., PR), Praha-Libeň (Opiz 1849, PR), Praha: haud procul ab urbe (F. I. Tausch s.a., PRC), Praha: in arvis ad urbem (Anonymus s.a., PRC), Nehvizdy (Velenovský in Čelakovský 1883 : 699).

Střední Polabí
Poříčany (E. Binder 1893, PRC et 1900, CB).

Východní Polabí

2) Author’s authentic indication is cited in inverted commas.
Mesophyticum

Smrčiny
Vojtany: in agris (Schleicher 1914, PRC), Wies [vicus extinctus] (DALLA TORRE 1878 : 16; etiam ČELAKOVSKÝ 1883 : 699).

Horní Poohři
Karlove Vary-Rybáře (Glückselig in ČELAKOVSKÝ 1868 : 40 et ORTMANN in ČELAKOVSKÝ 1883 : 699).

Přežanská pahorkatina
Přež (Anonymous in Herb. P. Hora s.a., PRC).

Podbrdsko
Hořovice (Schlechtendal in ČELAKOVSKÝ 1883 : 699).

Horažďovická pahorkatina

Budějovická páněv
České Budějovice: in vicin. opp. (Jechl s.a., BRNU, PR et PRC; etiam in ČELAKOVSKÝ 1868 : 40).

Třeboňská páněv
Soběslav: in horto scholae publicae (K. Stejskal 1908, PRC), Lomnice n. Luž.: ager A. sativae (Weidmann 1882, PRC; 1883, BRA; 1884, BRA et BRNM; 1886, PR), Tučapy: inter segetes ad pagum (Berchtold 1808, PRC et s.a. BRNU; etiam in ČELAKOVSKÝ 1868 : 40; vide etiam in Berchtold et Seidl 1836 : 178 sub "circulus Taborensis").

Světláková páněv

Votická pahorkatina
Vojkov: in agro Avenae orientalis copiose (Drtina in ČELAKOVSKÝ 1886 : 7).

Verneřické středohoří
Děčín (Malínský in ČELAKOVSKÝ 1868 : 40).

Šlukovská pahorkatina
Šluknov: ager A. sativae (Karl s.a., PR et PRC; etiam in ČELAKOVSKÝ 1868 : 40).

Luzická kotlina
Liberec: in agris ad opp. (C. T. [i.e. Tochl] s.a., PR; TAUSCH in ČELAKOVSKÝ 1868 : 40).

Luzické hory
Kamenický Šenov (Handschke in ČELAKOVSKÝ 1886 : 7).

Podještědí
Česká Lípa: in agro A. sativae dispersim (C. MELL s.a., PRC), Nový Bor (E. Hackel 1879, PR; etiam in ČELAKOVSKÝ 1883 : 699), Mimoň (ŠOUTA in ČELAKOVSKÝ 1868 : 40).

Orlické opuky
Častolovicce (Anonymous s.a., HR).

Litomyslská páněv
Sloupnice: "in agro ad vicum copiose cum A. sativa, sed unico loco" (FLEISCHER 1884, BRA, BRNU et PRC); "in agris cum A. sativa ad Sloupnice, unico loco sed frequentissima" (FLEISCHER in Herb. BuBela 1884, BRNU); "cum A. sativa ad Sloupnice" (FLEISCHER 1895, BRA, BRNU et OLM); "colui in horto meo" (FLEISCHER, "Hortus regiae academiae pro agricultura, Tábor-Bohemia", 1907, BRNU et OLM; 1927, PRC).
Českomoravské mezihori

Říčanská plošina
Šťůn (Švůra in Berchtold et Seidl 1836 : 178; etiam in Čelakovský 1868 : 40), Žernovka [probabiliter]: in agris ad pagum cum speciebus Arnoseris minima et Hypochoeris glabra (Domín 1904 : 63).

Kutnohorská pahorkatina
Časlav: ager A. sativae (Lukeš 1891, PR; Wilhelm 1906, PRC), Žleby: ad peripheriam occid. opp., loco dicto "Sv. Anna" (Opiz in Čelakovský 1868 : 40, vide sub "Sv. Anna časlavská").

Hornosázavská pahorkatina
Havlíčkův Brod (Opiz 1822 : 266), Chotěboř: ager A. sativae loco dicto Sv. Anna (J. N. Bayer 1907, PR), Přibyslav: ager A. sativae (Vítoušek 1895, BRNU), M. Losenice: ager A. sativae (ibid.), Vepřová: ager A. sativae (ibid.).

Českomoravská vřehovina

Moravské podhůří Vysočiny
Jevišovice: inter segetes (Oborny 1873, BRNU et PRC; etiam in Oborny 1883 : 134, Formánek 1887 : 106 et Podpéra 1925 : 602), Bojanovice (Oborny 1883 : 134; etiam in Formánek I.e. et Podpéra I.e.).

Hanušoviccko-rychlebská vřehovina
Chrastice (Formánek 1887 : 106; etiam in Podpéra 1925 : 602), Staré Město (Oborny 1883 : 134, etiam in Formánek I.e. et Podpéra I.e.), Hanušovice (Formánek I.e. et Podpéra I.e.), Hanušovice et Zábřeh na Mor.: inter opp. in valle flumin. Morava (Oborny I.e.; etiam in Formánek I.e. et Podpéra I.e.), Hajnrovec (Formánek I.e. et Podpéra I.e.), Pasté Žižkodolice (ibid.), Šumperk: ager A. sativae (J. Paul 1862, PRC; Paul in Oborny I.e.; etiam in Formánek I.e. et Podpéra I.e.), Branná: inter segetes (Oborny 1873, PRC; Oborny 1883 : 134; vide sub "Goldenstein"); etiam in Formánek I.e. et Podpéra I.e.; vide sub "Kolštýn"; Laus 1934, PRC), Alojzov (Formánek I.e. et Podpéra I.e.), in valle fluminis Branná (Oborny I.e., Formánek I.e. et Podpéra I.e.), Kouty n. Desnou (Formánek I.e. et Podpéra I.e.).

Jesenické podhůří
Rýmařov (Formánek 1887 : 106; etiam in Podpéra 1925 : 602), Velká Střelná [vicus extinctus] (Formánek I.e. et Podpéra I.e.).

Oreophyticum
Krušné hory
Nedějk: ad viam publicam pr. opp. (Schiffner 1882, PRC).

Jihlavské vřehy
Rášná (Formánek 1887 : 106; etiam in Podpéra 1925 : 602).

Žďárské vřehy
Fryšava (Formánek 1887 : 106; etiam in Podpéra 1925 : 602), Tři Studně (ibid.), N. Město na Mor. (ibid.).

3) Domín (1904 : 63) described the locality as "Feldern bei Žemlovka" unweit von Řičany. However, a village of this name exists (and existed) neither in the environs of the town Řičany nor elsewhere in Czechoslovakia (cf. Collectivum 1978).
RESULTS DERIVED FROM THE DISTRIBUTION OF *AVENA STRIGOSA* IN CZECHOSLOVAKIA

The localities known hitherto in Bohemia and Moravia represent 90.8% of the total number; the phytogeographical region *Mesophyticum* takes the greater proportion of this percent (59.3%), whereas only a smaller proportion belongs to the phytogeographical regions *Thermophyticum* (22.2%) and *Oreophyticum* (9.3%). In Slovakia, only a small proportion of localities (9.2%) could be stated, predominantly in the phytogeographical region *Carpathicum occidentale* (8.3%). The accumulation of localities in the phytogeographical districts Českomoravská vrchovina (12%) and Hanušovicko-rychlebská vrchovina (10.2%) may be pointed out as quite typical. This pattern of distribution of *A. strigosa* in Czechoslovakia corresponds well with its original distribution in Western Europe with Atlantic or subatlantic climate.

Analysing the relationships to macro-climate in Czechoslovakia (see in Vesecký et al. 1958), it can be concluded that the greater part of the lo-
calities are confined to the moderately warm region (especially to the districts which are moderately humid, humid or very humid) within the isotherms of mean annual temperature 5 °C and 7 °C and within the isohytes of total annual precipitations 650 mm and 900 (1200) mm.

As to the altitudinal range, the greatest part of the localities are situated between 500 and 800 m, which corresponds to the submontane belt (cf. HOLUB et JIRÁSEK 1967), and only a small part lies in the planar and montane belt. In lowland, localities can be found predominantly on sandy soils along the river Labe (e.g. Déčín, Předonín, Veltrusy, Bohdaneč), whereas the most elevated localities are situated in the Carpathian Mts. of Slovakia (Polianky up to 980 m, Šálova ca. 900 m), partly also in Bohemia (environ of the village Rýchory ca. 900—980 m, see in PAX 1883 : 447) and presumably in the Jeseníky Mts in Moravia (ROHRER et MAyER 1835 : 21).

Concerning soil conditions (cf. HRAŠKO et al. 1973) the leading position is obviously held by brown forest soils of low base saturation developed on various substrates (granite, gneiss, phyllite or various schists), and partly by podzols and rhegiosols (the latter soil type occurs in the lowland of the river Labe).

When compared with the map of agronomic production zones the area of dense localities of A. strigosa corresponds well to the potato zone and partly to the mountain production zone (cf. Anon. 1961).

Regarding the geobotanical map of Bohemia and Moravia (MORAVEC et NEUMBÄUER, 1976) the following units of reconstructed natural vegetation may be enumerated among those which correspond the most: Lužulo-Fagion Lohmeyer et TX. 1954, Fagion Luquet 1926 em. Pawlowski 1928, and partly Quercion robori-petraeae Br.-Bl. 1932 p.p.

As shown above, A. strigosa was introduced into the territory of present-day Czechoslovakia presumably as a cultivated plant from western Europe as early as in the Bronze Age. It was evidently cultivated before the advent of the more profitable cultivated oat — A. sativa. Nevertheless, A. strigosa was cultivated for a relatively long period even after this change of cereals on sandy, poor soils and climatically hard conditions. Consequently, in these regions A. strigosa became repeatedly a wild growing plant, mostly a weed of spring cereals, chiefly of the cultivated oat — A. sativa. These facts can be supported by the following citations: „Zwischen dem Getreide auf Feldern...“ (POHL 1809, 1: 114); „Hochgesenke, im Gebirge angebaut“ (A. MAyER 1831, PCR); „Unter dem Sommergetreide in gebirgigen Gegenden, in Gesenke allgemein, zu­weilen auch für sich allein angebaut“ (ROHRER et MAyER 1835 : 21); „In Sandfeldern unter dem Sommergetreide“ (BERCHTOLD et SEidl 1836 : 178); „Unter dem Sommergetreide, hie und da als 'Sandhafer’, 'Purhafert' angebaut“ (SCHLOSSER 1843 : 389); „In fields among cereals, especially among cultivated oat“4) (ČELAKOVSKÝ 1868 : 40 et 1870 : 37); „Auf Feldern, na­mentlich unter Hafer, stellenweise häufig, besonders auf kaltem Sandboden... Offenbar durch Getreidebau eingeführt, doch schon ganz eingebürgert“ (OBORNY 1883 : 134); „Hier und da, besonders in der Liptau angebaut“ (ŠAGORSKI in ŠAGORSKI et SCHNEIDER 1891, 2 : 538). Many of these statements were also included in the works of FORMÁNEK (1887 : 106), LAUS (1908 : 158), and PODPÉRA (1925 : 602), who wrote that A. strigosa „was cultivated in mountain parts of Moravia and Silesia in the past“, ... „it is evidently an archaeophyte, nowadays quite naturalized, in Moravia it would grow until now relatively abundant in western Moravia, in the environs of the town Dačice...“, and frequently also in the foothills of the Jeseníky Mts."

Regarding the crops, data on the occurrence in cultivated oat (A. sativa) prevail quite clearly, e.g. on the labels of the following herbarium specimens: Paul 1862, PCR; POLAK 1878, PCR; VELENOVSKÝ 1880, PCR; WEIDMANN 1883, BRA et al.; FLEISCHER 1884, BRNU et al.; LUKES 1891, PR; BEZDĚK 1893, PR; BINDER 1893, PCR; VITOUSKÝ 1895, BRNU; KARL s.a., PR; TEUBER 1906, BRNM; J. N. BAYER 1907, PR; LAUS 1934, PCR. Similar statements can be found

4) Here only quotations written in Czech have been translated into English.
in the literature, e.g. in Čelakovský 1888 : 638, Vodák 1906 sec. Domin ms., etc. Very interesting information can be found on the label by H. Zavřel, locality Súľov in the Beskydy Mts. (BRA, 1946): "... it will be grown in a mixture with cultivated oat". On the other hand, a different indication has recently been given from the Slovenské Rudohorie Mts. (Kühn 1972 : 362): "Die Pflanze wird als minderwertig für Mensch und Vieh angesehen. Als selbständige Kultur kennt man sie nicht. Wenn ihr Anteil im Hafer zunimmt, wechselt man das Saatgut".

The following data are available concerning the abundance and frequency of A. strigosa: "passim" (Endlicher 1830 : 123), "copioso ... sed loco unico" (Fleischer 1884, BRNU et al.), copiously (Velenovský 1880, PRC; Velenovský 1883 in Čelakovský 1883 : 699; Zavřel 1946, BRA et BRNM), and on the contrary also "einzeln" (Teuber 1906, BRNM), "sehr vereinzelt" (Melt sa., PRC), etc.

Outside the arable land only few reports could be found, e.g. "... an Zäunen, Wegen und in Wäldern" [?! - Z. K.] (Pohl 1899, 1 : 114), "ad sepess et vias" (Endlicher 1830 : 123), "in graminosis ad Jaroměř" (Fleischer 1881, PR), "... an der Plattauer Strasse bei Neudék" (Schif fner 1882, PRC), "loca inculta ad Chueche pr. Pragam" (Domin 1901, PRC), ruderal site below the place called "Bubeneč" in Pardubice (Hadač J. et Hadač E. 1948 : 58).

In conclusion, it must be emphasized that the author of this paper has not succeeded in finding A. strigosa in evidently "good" localities in Bohemia and Moravia in the course of the last ten years. On the contrary, some new localities were revealed in Slovakia not long ago (Küh n et al. 1976, Küh n 1977 in litt.). This was due to home-made seeds of cereals used for sowing in some parts of Slovakia until recently (cf. Küh n et al. 1976), whereas in Bohemia and most parts of Moravia this habit was abandoned much earlier and cleaned seeds only were sown. This fact plays an important role in analysing the diminishing occurrence of A. strigosa in Czechoslovakia; here, it is evidently an old ergasiolipophyte (sensu Thellung in Nae gelt et Thellung 1905) whose mode of dissemination is chiefly speirochory (cf. Hilbig et al. 1962, Kornaš 1972). Caryopses of A. strigosa do not survive in the soil for they are not dormant as experimentally shown by Barralis (1965). Consequently, A. strigosa practically disappeared from the arable land of Bohemia and Moravia, and it is in process of extinction in Slovakia. The same situation exists e.g. in Bromus secalinus or Lolium temulentum that were placed together with A. strigosa in the same group called "Lolium remotum group" by Hilbig et al. (1962 : 441). Bromus secalinus, Lolium temulentum and L. remotum have recently been listed under the "critically threatened taxa" in Bohemia and Moravia (Holub et al. 1979 : 225—226). On the contrary, e.g. Avena fatua shows typical dormancy and a long-term viability of caryopses in the soil, which results in its persistence on arable land. Owing to this feature A. fatua became a serious and widely distributed weed throughout the whole temperate zone of the world.

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SOUHRN

Avena strigosa Schrber. — oves hřebilkatý (Dostál et al. 1950) či oves hubený (Dostál 1954, 1958) — byl kdysi na území Československa pěstován a vyskytoval se též jako počí plavek, dnes se však stal mizícím druhem zdejší flóry. Nejprve se uveden přehled různých taxonomických koncepí druhu A. strigosa. V širším pojetí Mal'čevové (Mal'čev 1939) zahrnovalo druh 8 infraspecifických taxonů, z nichž 6 bylo klasifikováno na úrovní poddruhu (subspecies) a 2 na úrovní proles. Podle poslední monografie rodu oves od Bauma (Baum 1977) je všech 8 taxonů klasifikováno na úrovní druhů, něžnejších dokonce do tří nově definovaných sekci. A. strigosa Schrber. s. str. je řazena do sekce Agraria Baum spolu s těmito druhy: A. brevis
Roth, A. *nuda* L. a *A. hispanica* Ard. Tato sekce se vyznačuje především nerozdavostí klásků, což je charakteristické pro kulturní druhy, kdežto některé další příbuzné druhy, vyznačující se rozpadavostí klásků, náleží již do sekce *Tenuicarpa* Baum (např. *A. hirtula* Lagasca, *A. barbata* Pott ex Link, *A. viestii* Steudel). Rozlišování blízkých příbuzných druhů v secké *Agraria* pomoci morfologických a mikromorfologických znaků, nově definovaných zejména Baumem, obsahuje Tab. I a Fig. 2 a 3. Ve známé příručce „Exkursionsflora“ (Rothmaler et al. 1976) je aplikována taxonomická koncepce tří poddruhů v rámci druhu *A. nuda* L. em. Mansf.: (a) *subsp. nuda*, (b) *subsp. brevis* (Roth) Mansf., (c) *subsp. strigosa* (Schrebb.) Janchen (= *A. strigosa* Schrebb. s. str.).


Rozšíření *A. strigosa* s. str. v ČSSR je dokumentováno seznamem 108 lokalit, pocházejících jednak z údajů na schédách revidovaných herbarůvých položek a jednak z většího dostupné literatury. V bodovém kartogramu rozšíření (*Fig. 4*) bylo možno zobrazit 104 lokality, graficky rozlišené do 4 časových intervalů po 50 letech, počínaje o. r. 1801. Největší lokalizace pochází z let 1851—1900 (70,4 %), kdežto po r. 1951 až doposud bylo zjištěno pouze 6,5 % lokalit. Pokud je o území členění, je naprostá většina lokalit sjednuvána v Čechách a na Moravě (90,8 %), ze Slovenska však pocházejí nejmladší lokality. Zvláště typické byly výskytby na Českomoravské vrchovině a v Hanušovicko-rychlebské vrchovině, udávané starší literaturou (*OBORNY 1883, FORMÁNEK 1887, PODPRA A 1925*). Na známých lokalitách v českých zemích se však dnes druh prakticky nevyskytuje. Většina dosud známých lokalit je vázana na klimatickou oblast mírné teplou a liché půdy olopatbice, převažně v submontánním stupni. Z fytogeografických oblastí převládá v českých zemích *Mesophyticum* (dle nového členění in *Anonymous 1977*) a na Slovensku *Carpathicum occidentale* a pokud jde o geobotanickou mapu Čech a Moravy, nejvíce lokalit se kryje s jednotkami *Luzulo-Fagion* a *Quetion*. Literární a herbarové údaje hovoří přesvědčivě též o pěstování *A. strigosa*, zejména v minulém století. Subspontánně se vyskytovalo jako segetal je v sovětském světě a jako ruderál poměrně vzácně na pustých místech. Oves hřebíkatý se rozšířuje převážně spořechorně. Vzhledem k tomu, že jeho obilky nemají domácí, nemohou přetrživat v orné půdě a chovaje se podobně jako např. *Bromus secalinus*, *Lolium temulentum* či *L. remotum*. Na Slovensku, kde se v odlučitých hornatých krajinách používá dosedává domácí osovo, se tak mohl oves hřebíkatý ještě udržet jako plevelná příměs, zejména v osvětě.

*A. strigosa* je v Československu starým ergasioslopyfym (tj. kulturním reliktem ve smyslu Thellungové in NAGEL & THELLUNG 1905) s biologickou vlastností dalšího omezeného šíření jakožto plevele nevyužitěným osiven (zejména v osvětě setem). Nemůže se proto stát žádným nebezpečným plevelem jako např. příbuzný druhy *A. faua*, šířící se nejen osvim a dalšími způsoby, ale vynikající zejména výraznou domácí obilek a schopnost jejích přežívání v orné půdě.

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