

ASPECTS OF FLORISTIC DIVERSITY IN THE TOPOLOG COMMUNE (TULCEA COUNTY): I – SEGETAL FLORA

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Abstract

Botanical reports made during the months of July and October in wheat, barley, maize, sunflower and soybean crops allowed to make an inventory of segetal species and to characterize this kind of flora in terms of floristic composition, general distribution, biological and ecological types.

Key words: *segetal flora, Topolog commune, Tulcea county.*

INTRODUCTION

References to wild species found „in cultivated lands, crops” in Dobrogea, are present in the first paper on the flora of this area (Branza, 1885) and in subsequent work (Anghel et al., 1970; Anghel et al., 1972; Chirilă, 2001; Chirilă et al., 2002, Ciocârlan et al., 2004; Zaharidi and Drimuș, 1954).

The Dihoru and Doniță study (1970) on flora from the Babadag Plateau include a chapter about segetal species discussing the results of the mapping in crops such as maize, grape vines, sunflowers, wheat, flax, alfalfa, beans, orchards as well as shelterbelts, balks, edges of cultivated fields or roads (performed in 7 characteristic points).

Our research, conducted in the Topolog commune (Tulcea county), aims to update and supplement existing data on weeds from the central part of Dobrogea.

MATERIALS AND METHODS

Topolog commune is placed in the northwestern part of the Tulcea county, on the 22A national road, Hârșova-Tulcea.

Geographically, the commune is situated in the central-northern part of Casimcea Plateau (Central Dobrogea Plateau), bordering to the north with Babadag Plateau; it is an area whose geological substrate consists of green schist which sometimes appear on the surface (Ghinea, 1996); its landscape is the hills above 300 m high (Figure 1). In terms of flora, the

area is included in the Pontic-South-Siberian Region, Danube-Black Sea Province, Northern Dobrogea Forested District (Ciocârlan, 2009).



Figure 1. Hills and folded green schist on surface near the village Fagarasul Nou (Tulcea county)

The commune consists of Topolog, the central village, and other six villages. The main occupation of the inhabitants is agriculture, growing cereals, industrial crops and livestock (<http://www.primariatopolog.paginadestart.com>). The plant species inventory was conducted on land located at the entrance to the Fagarasul Nou village and the adjacent area of the Luminita village. The reports was conducted from October 2010 to October 2011 to observe summer and autumnal aspects of segetal flora of winter grain crops (wheat, barley), maize, sunflower and soybean. Areas were investigated by crossing diagonally and

recording the encountered plant species in phytosociological tables. To characterize vegetation in terms of floral composition and biological and ecological types, for each species were noted the systematic family, the geographic element, the class and the lifetime, the life forms, the flowering period, the ecological indicators, and the distribution in our country.

RESULTS AND DISCUSSIONS

Segetal flora according to the crop plant

In the winter wheat crop the following species were found: *Consolida regalis*, *Salsola kali* subsp. *ruthenica*, *Falopia convolvulus*, *Melilotus albus*, *Euphorbia agraria*, *Daucus carota*, *Diplotaxis tenuifolia*, *Reseda lutea*, *Anagalis arvensis*, *Cynancum acutum*, *Ajuga chamaeptytis*, *Stachys annua*, *Carduus acanthoides*, *Centaurea spinulosa*, *Chondrilla juncea*, *Xanthium saccharum*, *Elymus repens*.

In winter barley crop noted segetal species were: *Consolida regalis*, *Glaucium corniculatum*, *Canabis sativa* subsp. *spontanea*, *Chenopodium album*, *Salsola kali* subsp. *ruthenica*, *Diplotaxis tenuifolia*, *Anagalis arvensis*, *Heliotropium europaeum*, *Datura stramonium*, *Artemisia scoparia*, *Onopordon tauricum*, *Xanthium spinosum*, *Cynodon dactylon*, *Setaria viridis*, *Setaria pumila*.

28 segetal species were listed in winter cereals. Comparing the data collected with that in Dihoru and Doniță's work (1970) it was found that 16 species also occur in wheat crop reports from Babadag Plateau, 6 species are found in other cultures of that area and 6 species are not found in the list of segetal species of the Babadag Plateau (*Melilotus albus*, *Daucus carota* subsp. *carota*, *Cynancum acutum*, *Ajuga chamaeptytis*, *Xanthium saccharatum* *Artemisia scoparia*).

Segetal species encountered in the summer reports associated to the maize crop were: *Amaranthus blitoides*, *Salsola kali* subsp. *ruthenica*, *Melilotus officinalis*, *Hibiscus trionum*, *Convolvulus arvensis*, *Heliotropium europaeum*, *Stachys annua*, *Centaurea cyanus*, *Setaria pumila*, *Sorghum halepense*. By comparing the results of our reports with those

of Dihoru and Doniță it has been observed that of the 10 segetal species recorded, 8 species are common with those found in maize crops from Babadag Plateau and 2 species are found in other crops from that area.

Segetal flora of sunflower include: *Amaranthus blitoides*, *Falopia convolvulus*, *hibiscus trionum*, *Reseda lutea*, *Convolvulus arvensis*, *Lappula squarossa*, *Solanum nigrum*, *Centaurea solstitialis*, *Xanthium saccharatum*, *Setaria pumila*, *Sorghum halepense*. Of the 11 species of weeds noted in in this crop, 5 species were found also in the records of Babadag Plateau (Doniță and Dihoru, 1970), 5 species appear in other crops and 1 species were not found in the above-mentioned work.

In soybean crop the following species were marked in the summer reports: *Consolida regalis*, *Papaver dubium*, *Chenopodium album*, *Hibiscus trionum*, *Cynanchum acutum*, *Convolvulus arvensis*, *Heliotropium europaeum*, *Lappula squarossa*, *Carduus thoermeri*, *Conyza canadensis*, *Phragmites australis*, *Setaria pumila*, *Sorghum halepense*. Overall, in this type of crop were recorded 13 species of weeds. Our results indicate the presence of two species that are not found in segetal species lists from Babadag Plateau (Dihoru and Doniță, 1970), *Cynanchum acutum* and *Phragmites australis* respectively.

Vegetation peculiarities in terms of floristic composition and general distribution (geographic element)

Regarding the floristic composition our collected data indicates that the 40 species found in the field belong to 20 families. The distribution of the species into families is the following: Ranunculaceae-1 species, Papaveraceae-2 species; Cannabaceae-1 species, Amaranthaceae-1 species, Chenopodiaceae-2 species, Polygonaceae-1 species, Fabaceae-2 species; Euphorbiaceae-1 species; Apiaceae-1 species, Malvaceae-1 species, Brassicaceae-1 species; Resedaceae-1 species, Primulaceae-1 species; Asclepiadaceae-1 species, Convolvulaceae-1 species, Boraginaceae-2 species, Lamiaceae-2 species, Solanaceae-2 species, Asteraceae- 10 species, Poaceae-6 species (Table 1).

Table 1. Floristic composition and general distribution of segetal species of the commune Topolog

Species	Sistematic family	Geographic element
1. <i>Consolida regalis</i>	Ranunculaceae	Eur
2. <i>Papaver dubium</i>	Papaveraceae	Eur
3. <i>Glaucium corniculatum</i>	Papaveraceae	Medit
4. <i>Cannabis sativa</i> subsp. <i>spontanea</i>	Cannabaceae	Cont.euras
5. <i>Amaranthus blitoides</i>	Amaranthaceae	North – Am.
6. <i>Chenopodium album</i>	Chenopodiaceae	Cosm
7. <i>Salsola kali</i> subsp. <i>ruthenica</i>	Chenopodiaceae	Euras
8. <i>Fallopia convolvulus</i>	Polygonaceae	Circ
9. <i>Melilotus albus</i>	Fabaceae	Euras
10. <i>Melilotus officinalis</i>	Fabaceae	Euras
11. <i>Euphorbia agraria</i>	Euphorbiaceae	Pont.-balc
12. <i>Daucus carota</i> subsp. <i>carota</i>	Apiaceae	Euras
13. <i>Hibiscus trionum</i>	Malvaceae	Euras
14. <i>Diploaxis tenuifolia</i>	Brassicaceae	Centr.eur.-medit
15. <i>Reseda lutea</i>	Resedaceae	Euras
16. <i>Anagalis arvensis</i>	Primulaceae	Circ
17. <i>Cynanchum acutum</i>	Asclepiadaceae	Pont.-medit
18. <i>Convolvulus arvensis</i>	Convolvulaceae	Cosm
19. <i>Heliotropium europaeum</i>	Boraginaceae	Submedit
20. <i>Lappula squarrosa</i>	Boraginaceae	Euras
21. <i>Ajuga chamaeepytis</i>	Lamiaceae	Pont.-medit
22. <i>Stachys annua</i>	Lamiaceae	Submedit
23. <i>Datura stramonium</i>	Solanaceae	Cosm
24. <i>Solanum nigrum</i>	Solanaceae	Cosm
25. <i>Artemisia scoparia</i>	Asteraceae	Cont.euras
26. <i>Carduus thoermeri</i>	Asteraceae	Pont.-balc
27. <i>Centaurea cyanus</i>	Asteraceae	Cosm
28. <i>Centaurea solstitialis</i>	Asteraceae	Medit
29. <i>Centaurea apiculata</i> subsp. <i>spimulosa</i>	Asteraceae	Centr. și SE Eur
30. <i>Chondrilla juncea</i>	Asteraceae	Cont.euras
31. <i>Coryza canadensis</i>	Asteraceae	North – Am.
32. <i>Onopordum tauricum</i>	Asteraceae	Balc
33. <i>Xanthium saccharatum</i>	Asteraceae	North – Am.
34. <i>Xanthium spinosum</i>	Asteraceae	Cosm
35. <i>Cynodon dactylon</i>	Poaceae	Cosm
36. <i>Elymus repens</i>	Poaceae	Circ
37. <i>Phragmites australis</i>	Poaceae	Cosm
38. <i>Setaria pumila</i>	Poaceae	Cosm
39. <i>Setaria viridis</i>	Poaceae	Cosm
40. <i>Sorghum halepense</i>	Poaceae	Medit

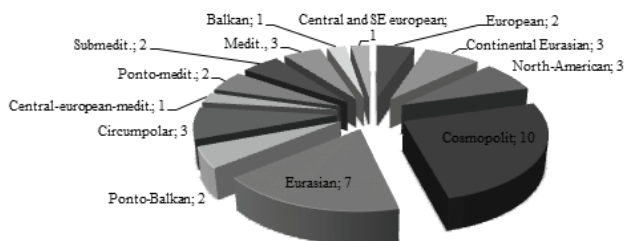


Figure 2. Spectrum of the segetal species of the commune Topolog in terms of geographic element

The analysis of the general distribution (the categories of the geographic elements) (Figure 2) indicates cosmopolitan species (10) as the majority, followed by Eurasian category of species (7) considered the most represented in cormoflora Romania (Cristea et al., 2004); 3 species are of North-American origins, 3 are

circumpolar and 2 are European species. The remaining 14 species originating in warm climates, some with water deficit registered in summer months, from Europe or continental Asia: Eurasian Continental (3), Ponto-Balkan (2), Central European-Mediterranean (1), Ponto-Mediterranean (2), Submediterranean (2),

Mediterranean (3), Balkan (1), Central and SE Europe (1) (Table 1).

Vegetation peculiarities in terms of biological types

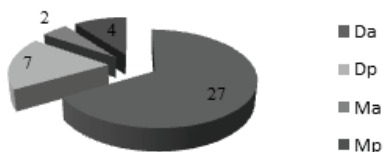


Figure 3. Spectrum of the village Topolog segetal species according to class and lifetime (Da – dicotyledonous annual; Dp – dicotyledonous perennial; Ma – monocotyledonous annual; Mp – monocotyledonous perennial)

According to the ratio between species depending on class and lifetime, annual dicotyledonous species constitute the majority in the communities studied-67.5% (27 species), perennial dicotyledonous represent 17.50% of all species (7 species), monocotyledonous annual 5% (2 species) and the perennial monocotyledonous 10% (4 species) (Table 2, Figure 3).

As regards the form of life, most species, 17, belong to the category Therophyta-plants undergoing lifecycle, from seed, in one growing season; annual hibernating and bisanuale species included in Hemiterophyta are 12 in number; 5 species belong to the category Hemicryptophyta; one species is from Chamaephyta; 5 species belong to the category Geophyta (Table 2).

The analysis of the distribution of species depending on the time of flowering indicates that most species are blooming in the summer months (June to September) (Table 2).

Vegetation peculiarities in terms of ecological types and distribution in the country

Vegetation analysis based on ecological factors (Table 3) reveals that the dominant species are those whose requirements are low relative to the humidity factor, medium and high relative to the temperature factor, and are indifferent or neutro-alkalinophilic in terms of soil pH.

In terms of wather requirements, 16 species are xero-mesophilic, 11 xerophilic, 8 mesophilic, 2 euryhydric and one hygrophilic (Figure 4).

Concerning the air temperature 19 species are moderately thermophilic, 6 thermophilic, 11 eurythermal and 4 micro-mesothermophilic (Figure 5).

On the requirements for soil pH we observed that 19 species are euryacidophilic, followed by those neutro-alkalinophilic – 15 species, those weakly acido-neutrophilic – 5 species; one species is acido-neutrophilic (Figure 6).

Ecological factors with an important role in plant distribution in this area are soil moisture and temperature, similar to that in the Babadag Plateau (Bindiu et al., 1971).

Related to the distribution in the country, most species are common from the steppe zone to sessile oak floors, areas where the average annual temperature is between 8 and 10.50 C. 3 of the species-Cynancum acutum, Carduus thormeri and Onopordon tauricum are found only in the SE of the country, in Dobrogea's counties (Table 3).

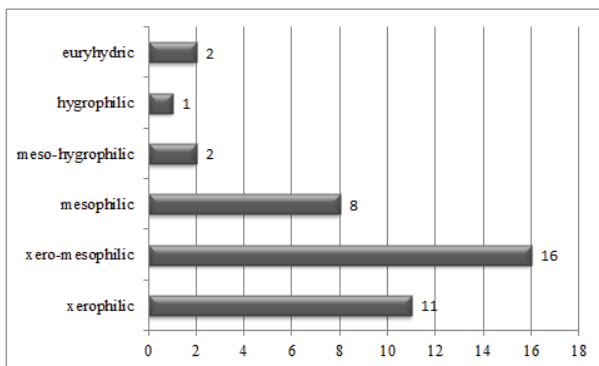


Figure 4. Segetal species spectrum according to soil moisture

Table 2. Segetal species of crops in the commune Topolog according to sistematic class and lifetime, form of life, and the flowering period

Specia	Systematic class and lifetime	Form of life	Floweing period
1. <i>Consolida regalis</i>	Da	Th, Ht	VI-VII
2. <i>Papaver dubium</i>	Da	Th	V-VI
3. <i>Glaucium corniculatum</i>	Da	Th	VI-VIII
4. <i>Cannabis sativa</i> subsp. <i>spontanea</i>	Da	Th	VII-VIII
5. <i>Amaranthus blitoides</i>	Da	Th	VII-X
6. <i>Chenopodium album</i>	Da	Th	VII-X
7. <i>Salsola kali</i> subsp. <i>ruthenica</i>	Da	Th	VI-IX
8. <i>Fallopia convolvulus</i>	Da	Th	VI-IX
9. <i>Melilotus albus</i>	D2a	Ht	VI-IX
10. <i>Melilotus officinalis</i>	D2a	Ht	VI-IX
11. <i>Euphorbia agraria</i>	Dp	H	VII-VIII
12. <i>Daucus carota</i> subsp. <i>carota</i>	Da (winter)	Ht	VI-IX
Specia	Systematic class and lifetime	Form of life	Floweing period
1. <i>Hibiscus trionum</i>	Da	Th	VI-VIII
2. <i>Diploaxis tenuifolia</i>	Dp	H (Ch)	V-IX
3. <i>Reseda lutea</i>	Da-Dp	Ht-H	V-IX
4. <i>Anagalis arvensis</i>	Da-Da (winter)	Th-Ht	VI-IX
5. <i>Cynanchum acutum</i>	Dp	H	VI-VII
6. <i>Convolvulus arvensis</i>	Dp	(G) H	V-IX
7. <i>Heliotropium europaeum</i>	Da	Th	V-VII
8. <i>Lappula squarrosa</i>	Da-D2a	Th,Ht	VI-VII
9. <i>Ajuga chamaeptytis</i>	Da	Th	V-VIII
10. <i>Stachys annua</i>	Da	Th	V-VIII
11. <i>Datura stramonium</i>	Da	Th	VI-IX
12. <i>Solanum nigrum</i>	Da	Th	VI-X
13. <i>Artemisia scoparia</i>	D2a	Ht	VII-IX
14. <i>Carduus thoermeri</i>	D2a	Ht	VI-VII
15. <i>Centaurea cyanus</i>	Da (winter)	Th,Ht	VI-VIII
16. <i>Centaurea solstitialis</i>	D2a	Ht	VI-X
17. <i>Centaurea apiculata</i> subsp. <i>spinulosa</i>	Dp	H	VI-IX
18. <i>Chondrilla juncea</i>	D2a-Dp	Ht-H	VII-IX
19. <i>Conyza canadensis</i>	Da	Th	VI-IX
20. <i>Onopordum tauricum</i>	D2a	Ht	VI-VII
21. <i>Xanthium saccharatum</i>	Da	Th	VII-IX
22. <i>Xanthium spinosum</i>	Da	Th	VII-X
23. <i>Cynodon dactylon</i>	Mp	G	VI-VIII
24. <i>Elymus repens</i>	Mp	G	VI-VII
25. <i>Phragmites australis</i>	Mp	G	VII-IX
26. <i>Setaria pumila</i>	Ma	Th	VI-X
27. <i>Setaria viridis</i>	Ma	Th	VII-X
28. <i>Sorghum halepense</i>	Mp	G	VI-VIII

Systematic class, lifetime: Da – dicotyledonous annual species; D2a – dicotyledonous bisannual species; Dp – dicotyledonous perennial species; Ma – monocotyledonous annual species; Mp – monocotyledonous perennial species

Life form: Th – *Therophyta*; Ht – *Hemiterophyta*; H – *Hemicryptophyta*; Ch – *Chamaephyta*; G-*Geophyta*

Flowering period: V-X – the months when plants are in flower

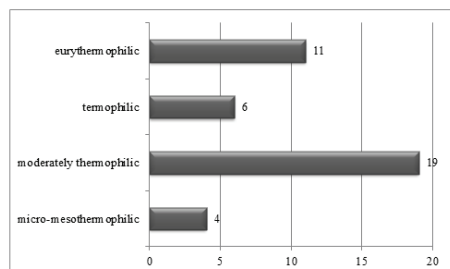


Figure 5. Segetal species spectrum according to air temperature

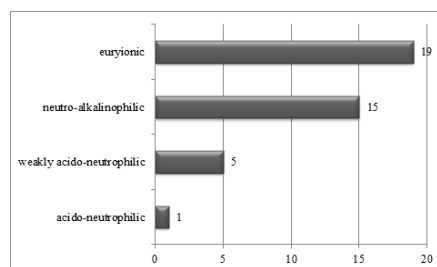


Figure 6. Segetal species spectrum according to soil pH

Table 3. Segetal species of the Topolog commune according to the requirements of environmental factors and country distribution

Specia	Soil moisture	Air temperature	Soil pH	Country distribution
1. <i>Consolida regalis</i>	2-2,5	0	5	steppe zone-ses.oak floor
2. <i>Papaver dubium</i>	2-2,5	4,5	5	steppe zone-ses.oak floor
3. <i>Glaucium corniculatum</i>	2-2,5	4,5	5	steppe zone-ses.oak floor
4. <i>Cannabis sativa</i> subsp. <i>spontanea</i>	2-2,5	4,5	0	steppe zone-ses.oak floor
5. <i>Amaranthus blitoides</i>	1-1,5	5	0	steppe-forest-steppe zone
6. <i>Chenopodium album</i>	3 – 3,5	0	0	steppe zone-beech floor
Specia	Soil moisture	Air temperature	Soil pH	Country distribution
1. <i>Salsola kali</i> subsp. <i>ruthenica</i>	1,5-2	5-5,5	5	steppe zone-ses.oak floor
2. <i>Fallopia convolvulus</i>	0	0	0	steppe zone-beech floor
3. <i>Melilotus albus</i>	2,5	3	0	steppe zone-beech floor
4. <i>Melilotus officinalis</i>	2,5	3,5	0	steppe zone-ses.oak floor
5. <i>Euphorbia agraria</i>	1,5-2	4,5-5	5	steppe zone-ses.oak floor
6. <i>Daucus carota</i> subsp. <i>carota</i>	0	0	0	steppe zone-ses.oak floor
7. <i>Hibiscus trionum</i>	2,5-3	4,5-5	4	steppe-nemoral zone
8. <i>Diplotaxis tenuifolia</i>	1,5-2	4,5-5	5	steppe-nemoral zone
9. <i>Reseda lutea</i>	2,5-3	4,5-5	5	steppe zone-ses.oak floor
10. <i>Anagalis arvensis</i>	3	0	0	steppe zone-beech floor
11. <i>Cynanchum acutum</i>	1,5-2	5	5	steppe-forest-steppe zone, in SE
12. <i>Convolvulus arvensis</i>	3	4,5-5	0	steppe zone-beech floor
13. <i>Heliotropium europaeum</i>	2,5-3	4,5-5	5	steppe zone-ses.oak floor
14. <i>Lappula squarrosa</i>	1,5	3,5	4	steppe zone-beech floor
15. <i>Ajuga chamaepytis</i>	1,5-2	5	5	steppe zone-ses.oak floor
16. <i>Stachys annua</i>	2,5-3	4,5-5	5	steppe zone-ses.oak floor
17. <i>Datura stramonium</i>	3	4,5-5	5	steppe zone-ses.oak floor
18. <i>Solanum nigrum</i>	3	0	5	steppe zone-beech floor
19. <i>Artemisia scoparia</i>	3	3	0	steppe zone-ses.oak floor
20. <i>Carduus thomeri</i>	1,5	5	3	steppe-forest-steppe zone, in Dobr.
21. <i>Centaurea cyanus</i>	3	0	0	steppe zone-beech floor
22. <i>Centaurea solstitialis</i>	2	4	0	steppe zone-ses.oak floor
23. <i>Centaurea apiculata</i> subsp. <i>spinulosa</i>	1,5-2	4,5-5	4	steppe-forest zone-beech floor
24. <i>Chondrilla juncea</i>	1,5-2	4,5-5	5	steppe zone-ses.oak floor)
25. <i>Coryza canadensis</i>	2,5-3	0	0	steppe zone-beech floor
26. <i>Onopordum tauricum</i>	1,5	4,5-5	5	steppe – forest-steppe zone
27. <i>Xanthium saccharatum</i>	4	5-4,5	0	steppe – nemoral zone
28. <i>Xanthium spinosum</i>	2,5-3	4,5-5	0	steppe zone-beech floor
29. <i>Cynodon dactylon</i>	2,5	4,5-5	4	steppe zone-ses.oak floor
30. <i>Elymus repens</i>	3	0	0	steppe zone-beech floor
31. <i>Phragmites australis</i>	5,5-6	0	4	steppe zone-beech floor, in crops, on groundwater-wet mold
32. <i>Setaria pumila</i>	4-4,5	0	0	steppe zone-beech floor
33. <i>Setaria viridis</i>	2,5-3	4,5-5	0	steppe zone-ses.oak floor
34. <i>Sorghum halepense</i>	2,5-3	4,5-5	0	steppe – nemoral zone

Soil moisture: 0 – euryhydric species; 1-1.5 – xerophilic species; 2-2.5 – xero-mesophilic species; 3-3.5 – mesophilic species; 4-4.5 – specie meso-hydrophilic species; 5-5.5 –hydrophilic species; 6 –hydrophilic specie

Air temperature: 0 – eurythermal species; 3-3.5 –micro-mesothermophilic species; 4-4.5 –moderately thermophilic species; 4.5-5 – thermophilic species

Soil pH: 0 –euryacidophilic species; 4 –weakly acido-neutrophilic species; 5 –neutro-alkalinophilic species

CONCLUSIONS

The segetal flora of the commune Topolog is composed of plants adapted to low soil moisture and high air temperatures, mostly

found from the steppe zone to sessile oak floor. Three species-*Cynanchum acutum*, *Carduus thomeri* and *Onopordon tauricum* have a limited area, living in the SE of Romania

(Dobrogea or Giurgiu, Tulcea and Constanta county).

Flora summer aspect is given by annual plant species, di-or monocotyledonous, with flowering period in the summer months, and which belong to categories of Therophyta and Hemitherophyta.

REFERENCES

- Anghel Gh., Chirilă C., Tănăsescu I., 1970. Considerații asupra ecologiei florei segetale din culturile de porumb. *Lucr. Șt. IANB, seria A, XIII*, p. 405-412.
- Anghel Gh., Chirilă C., Ciocârlan V., Ulinici A., 1972. Buruienile din culturile agricole și combaterea lor. Editura Ceres, București.
- Bîndiu C., Dihoru Gh., Doniță N., Drăguț N., Eliescu Gr., Hondru N., Ionescu M.A., Mărgărit Gr., Mocanu V., Niculescu-Burlacu F., Popescu – Zeletin I., Zamfirescu A., 1971. Cercetări ecologice în Podișul Babadag. Editura Academiei RSR, București.
- Branza D., 1898. Flora Dobrogei. Edițiunea Academiei Române. Institutul de Arte Grafice Carol Göbl, București.
- Chirilă C., 2001. Biologia buruienilor: organografie, corologie, dinamică, importanță. Editura Ceres, București.
- Chirilă C., Ciocârlan V., Berca M., 2002. Atlasul principalelor buruieni din România. Editura Ceres, București.
- Ciocârlan V., Berca M., Chirilă C., Coste I., Popescu Gh., 2004. Flora segetală a României. Editura Ceres, București.
- Ciocârlan V., 2009. Flora ilustrată a României: Pteridophyta et Spermatophyta. Editura Ceres, București.
- Cristea V., Gafta D., Pedrotti F., 2004. Fitosociologie. Editura Presa Universitară Clujeană, Cluj-Napoca.
- Dihoru Gh., Doniță N., 1970. Flora și vegetația Podișului Babadag, Editura Academiei RSR, București.
- Ghinea D., 1996-1998. Enciclopedia Geografică a României, vol. I, III. Editura Enciclopedică, București.
- Zaharidi C., Drimuș R., 1954. Combaterea prin erbicide a rapiței sălbatice din culturile de cereale. *Anale ICAR, seria 9, vol. XXI*, 2.
- <http://www.primariatopolog.paginadestart.com>