ANNALES UMCS
VOL. LXX(2) AGRICULTURA 2015

Department of Agricultural Ecology, University of Natural Sciences and Humanities in Siedlce
Bolesława Prusa 14, 08-110 Siedlce
e-mail: malgorzata.rekiel4@vp.pl

MAŁGORZATA REKIEL, JANINA SKRZYCZYŃSKA,
MARIA ŁUGOWSKA

Rare and endangered species of segetal flora in the Turobin commune

Rzadkie i zagrożone wyginięciem gatunki flory segetalnej gminy Turobin

Summary. The aim of the study was to make an inventory and describe the localities of interesting species inhabiting the segetal communities of the Turobin commune, which are regarded as endangered in Poland and Europe. The paper presents results of a field study conducted in 2011–2013 in crop fields, located on brown soils and rendzinas. Phytosociological relevés were made with the Braun-Blanquet method at the sites of phytocoenoses comprising interesting and endangered species. The habitat was assessed with the use of soil-agricultural maps, and soil pH was measured at the site where the phytosociological relevés were taken. In the Turobin commune, 32 interesting species were found; some of them are considered rare and endangered in Poland. In this group, the occurrence of *Asperugo procumbens*, regarded as an endangered species and included in the red list of vascular plants, is noteworthy.

Key words: declining species, crop fields, Turobin commune

INTRODUCTION

Literature reports indicate impoverishment of the vascular flora in Europe. In Poland, approximately 30% of vascular species are threatened with extinction [Falińska 1996]. The immediate cause of decreasing species diversity there are continuous changes in the natural environment induced by natural factors and the increasing anthropopressure [Michałowski 2003]. Human activity poses a threat to native flora and natural communities [Harasimowicz and Kostrubiec 2005]. Rural areas in Poland are characterised by unique biological and landscape diversity, which is exceptional in Europe. The major impact on the degree of transformation of the natural richness of agricultural land and rural landscapes is exerted by the increase in the intensity of land management [Dembek and Liro 2001]. Intensification of agriculture leads to a decline in the number of plant species occurring in the agricultural landscape [Kuszewska and Fenyk 2010]. During the last years, environmental scientists signal reduction issue floristic diversity of communi-

ties and segetal and have reported the problem of the decreasing floristic diversity of segetal communities and emphasised the need for conservation of the diversity of segetal species and communities to prevent retreat from agrocoenoses [Kornaś 1987, Siciński 2001, Fijałkowski 2003, Trzcińska-Tacik 2003, Stupnicka-Rodzynkiewicz *et al.* 2004, Trąba and Ziemińska-Smyk 2006]. Impoverishment or loss of biodiversity has suggested the necessity of compilation of red lists classifying species according to the category of threat within an entire country or region [Warcholińska 1994, Fijałkowski and Nycz 1998, Trąba and Ziemińska 1998, Zarzycki *et al.* 2002, Zarzycki and Szeląg 2006]. Undoubtedly, local floristic reports play an essential role in identification of currently endangered species. Therefore, the aim of the study was to present habitats of threatened and locally rare species segetal flora.

STUDY MATERIAL AND METHODS

The floristic-phytosociological observations were conducted in 2011–2013, which were carried out in agrocoenoses of the Turobin commune, at the time of the optimal development of the communities. They included an area belonging to 19 villages (fig. 1). The soil conditions were assessed on the basis of soil-agricultural maps at a scale of 1 : 5000. Moreover, at the observation sites, pH was measured in the top layer of the soil using a colorimetric method with the Hellig plate. Additionally, geographic coordinates were determined with GPS and used for distribution of the species in a 2,5 km ATPOL square grid. The phytosociological relevés were taken with the widely used Braun-Blanquet method. In total, 400 phytosociological relevés and 23 floristic inventories were made. The observations were carried out on brown soils and rendzinas. The occurrence frequencies were presented in an arbitrary scale, assuming that the number of localities was equal to the number of villages. Finally, the analysis of selected species also highlighted a number of lobes of their participation in various localities. A species was regarded extremely rare when noted in 1–2 locations, rare in 2–4 locations, frequent in 5–10 locations, common in 11–15 locations, and extremely common in 16–19 locations. The categories of threat posed to the species were established in accordance with the reports by Warcholińska [1994], Zarzycki and Szeląg [2006], Fijałkowski and Nycz [1998], and Trąba and Ziemińska [1998]. Categories of threat: Ex – extinct and probably extinct species, E – endangered, V – vulnerable, R – rare, I – indefinite status.

RESULTS

In 2011–2013, in 19 localities, the occurrence of 32 species of vascular plant taxa classified as rare or endangered. The location of the village is given in figure 1 below, the list of species with characteristic positions.

1. *Centaurea cyanus* L.: Turobin (EE 7900), Olszanka (FE 7920), Żabno (FE 7912), Kol. Żabno (FE 7913), Żurawie (FE 7922), Elizówka (FE 7901), Tokary (FE 7822), Czernięcin Główny (FE 7923), Guzówka Kolonia (FE 7900), Wólka Czernięcińska (FE 7933),

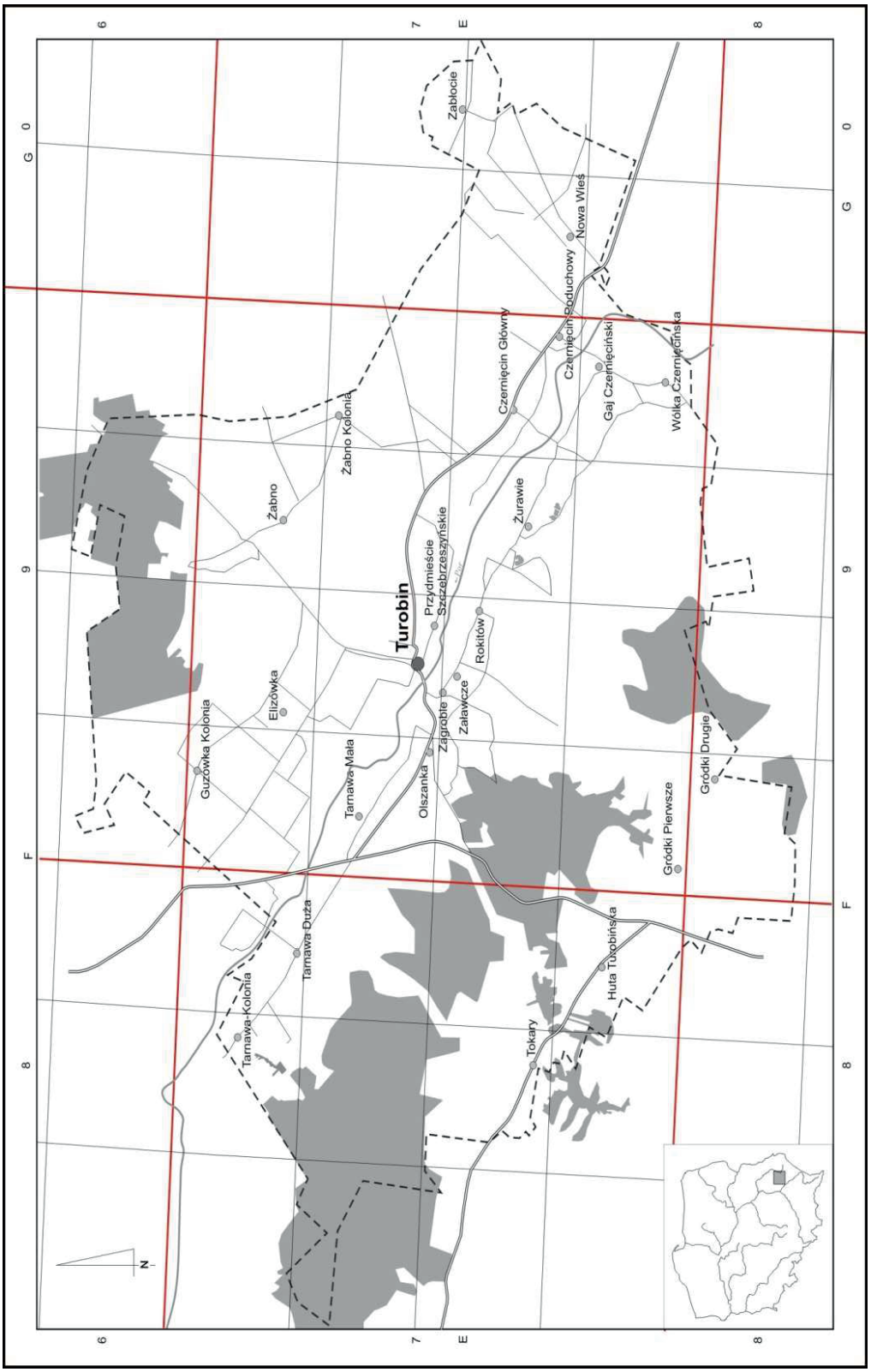

Fig. 1. The posts of rare and endangered species of flora segetal commune Turobin
Rys. 1. Stanowiska rzadkich i zagroŝonych wyginięciem gatunków flory segetalnej gminy Turobin

Czernięcin Poduchowny (FE 7923), Nowa Wieś (GE 7023), Zabłocie (GE 7023), Gródki Drugie (FE 7931), Gaj Czernięciński (FE 7933), Huta Turobińska (FE 7933), Przedmieście Szczebrzeszyńskie (EE 7911), Tarnawa Mała (FE 7910), Zagroble (FE 7921). The species is very common in the study area. It was highly abundant in some habitats, in quantity: 1, 2, 3. It was noted on brown soils in the pH range from 4 to 8 in Tokary, Zagroble, Elizówka, Żurawie, Gródki Drugie, Nowa Wieś, Huta Turobińska, Czernięcin Poduchowny, Przedmieście Szczebrzeszyńskie, Wólka Czernięcińska, Olszanka, Zabłocie, Żurawie, Tarnawa Mała, Kol. Żabno, Gaj Czernięciński, Czernięcin Główny, Guzówka Kolonia, on rendzinas with a pH of 4.5 in Elizówka and 7.5 in Żabno. Species recorded in spring barley and winter, with winter and spring wheat, rye, oats, buckwheat, mustard dirt, spring oilseed rape and winter, spring mix, corn, tabacco, sugar beet, potatoes and raspberries. Category of threat: I – according to Warcholińska [1994], I – Fijałkowski and Nycz [1998].

2. *Lathyrus tuberosus* L.: Zagroble (FE 7921), Olszanka (FE 7920), Tarnawa Mała (FE 7910), Elizówka (FE 7901), Tokary (FE 7822), Czernięcin Główny (FE 7923), Kol. Żabno (FE 7913), Zabłocie (GE 7023), Nowa Wieś (GE 7023), Wólka Czernięcińska (FE 7933), Żabno (FE 7912), Gaj Czernięciński (FE 7933), Gródki Drugie (FE 7932), Turobin (EE 7911), Czernięcin Poduchowny (FE 7923), Guzówka Kolonia (FE 7900), Żurawie (FE 7922). This very common species was dispersed over the entire area of the commune. In some localities, high density was noted, in quantity: +, 1, 2, 3. The species performed on brown soils in the range of pH 4 to 8 in Olszanka, Tokary, Nowa Wieś, Czernięcin Poduchowny, Zabłocie, Czernięcin Główny, Wólka Czernięcińska, Tarnawa Mała, Żurawie, Gaj Czernięciński, Gródki Drugie, Zagroble and on rendzinas in the range of pH od 4 to 7,5 in Żabno, Guzówka Kolonia, Turobin, Kol. Żabno, Elizówka. The weed infested spring barley and winter barley, spring and winter wheat, mixture of barley and oats spring oilseed rape, winter oilseed rape, sugar beet, potatoes, raspberries, black currant, poppy seed, parsley, oats, rye, triticale and long-term plantation of red clover. Category of threat: I – according to Warcholińska [1994], I – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

3. *Bromus secalinus* L.: Żurawie: (FE 7922), Przedmieście Szczebrzeszyńskie (EE 7911), Tokary (FE 7822), Tarnawa Mała (FE 7910), Zagroble (FE 7921), Elizówka (FE 7901), Żabno (FE 7912), Turobin (EE 7911), Kol. Żabno (FE 7913), Nowa Wieś (GE 7023), Olszanka (FE 7920), Gaj Czernięciński (FE 7932), Huta Turobińska (FE 7833), Czernięcin Główny (FE 7923), Czernięcin Poduchowny (FE 7923), Zabłocie (GE 7023). The species was a very common species across the entire area of the commune. It occurred quite abundantly in agricultural crop fields, in quantity: +, 1, 2, 3. Species recorded on brown soils in the pH range from 4.5 to 8 in Huta Turobińska, Czernięcin Główny, Przedmieście Szczebrzeszyńskie, Tarnawa Mała, Kol. Żabno, Nowa Wieś, Gaj Czernięciński, Olszanka, Tokary, Żurawie, Zagroble, Zabłociu and rendzinas in the pH range of 5 to 6.5 in Czernięcin Poduchowny, Żabno, Elizówka, Turobin. Species appeared in winter and spring wheat, triticale, spring barley and winter rye, spring mix, rye, corn, buckwheat, spring oilseed rape and winter rye, wild mustard, sugar beet, long-term plantation red clover, black currants and raspberries. Category of threat: V – according to Warcholińska [1994], V – Zarzycki and Szeląg [2006], I – Trąba and Ziemińska [1998], V – Fijałkowski and Nycz [1998].

4. *Papaver rhoeas* L.: Żabno (FE 7912), Turobin (EE 7911), Olszanka (FE 7920), Zagroble (FE 7921), Nowa Wieś (GE 7023), Czernięcin Poduchowny (FE 7923), Tarnawa Mała (FE 7910), Elizówka (FE 7901), Zabłocie (GE 7023), Kol. Żabno (FE 7913), Żurawie (FE 7922), Huta Turobińska (FE 7833), Guzówka Kolonia (FE 7900). The species is common in the study area. It was noted in agricultural crop fields in quantity: +, 1, 2, 3, 4. Species appeared on brown soils in the pH range from 4.5 to 8 in Zabłocie, Kol. Żabno, Tarnawa Mała, Nowa Wieś, Zagroble, Czernięcin Główny, Huta Turobińska, Żurawie, Olszanka and in rendzinas in the pH range from 5.5 to 7.5 in Żabno, Czernięcin Poduchowny, Turobin, Elizówka. The weed infested winter and spring wheat, spring and winter barley, mixture of barley and oats, triticale, corn, mustard dirt, spring and winter oilseed rape, sugar beet and fodder beet, potatoes. Category of threat: I – according to Warcholińska [1994], I – Fijałkowski and Nycz [1998].

5. *Consolida regalis* GRAY: Żabno (FE 7912), Kol. Żabno (FE 7913), Olszanka (FE 7920), Turobin (EE 7911), Wólka Czernięcińska (FE 7933), Elizówka (FE 7901), Czernięcin Główny (FE 7923), Zabłocie (GE 7023), Czernięcin Poduchowny (FE 7923), Tarnawa Mała (FE 7910), Zagroble (FE 7921), Nowa Wieś (GE 7023). A common species, occurring abundantly and densely in quantity: +, 1, 2. The occurrence of this species in brown soils in the pH range from 5 to 7 in Zabłocie, Zagroble, Nowa Wieś, Czernięcin Poduchowny, Wólka Czernięcińska, Czernięcin Główny, Tarnawa Mała, Olszanka, and rendzinas of pH from 4.5 to 7 in Kol. Żabno, Elizówka, Turobin, Żabno. Performed in the winter and spring wheat, spring and winter barley, triticale, winter and spring oilseed rape, crops of mustard, garlic, raspberries, sugar beet, barley and oats mixture. Category of threat: I – according to Warcholińska [1994], I – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

6. *Campanula rapunculoides* L.: Kol. Żabno (FE 7913), Olszanka (FE 7920), Nowa Wieś (GE 7023), Elizówka (FE 7901), Zabłocie (GE 7023), Tokary (FE 7822), Zagroble (FE 7921), Tarnawa Mała (FE 7910). Frequent species occurring in agricultural crop fields, in localities dispersed over the entire area of the commune in quantity: +, 1, 2. The species located on brown soils of pH 7 in Olszanka, of pH 7.5 in Zabłocie, of pH 5.5 in Tokary, of pH 6 in Nowa Wieś and on rendzinas of pH 6 in Kol. Żabno, of pH 6.5 in Elizówka, of pH 7 in Tarnawa Mała, of pH 7.5 in Zagroble. Species recorded in wild mustard, triticale, winter wheat, sugar beet, fodder beet, potato, buckwheat, red clover long-term plantations. Category of threat: I – according to Trąba and Ziemińska [1998].

7. *Melandrium noctiflorum* (L).: Czernięcin Główny (FE 7923), Nowa Wieś (GE 7023), Żabno (FE 7912), Żurawie (FE 7922), Turobin (EE 7911), Olszanka (FE 7920), Gaj Czernięciński (FE 7933), Elizówka (FE 7901). Most frequently, single specimens, in quantity: r, +. Preformed on brown soils with at pH of 7.5 in Żurawie and Czernięcin Główny, at pH of 7 in Gaj Czernięciński, at pH of 5 in Olszanka, at pH of 6.5 in Nowa Wieś, and on rendzinas of pH 7.5 in Żabno and Elizówka, of pH 7 in Turobin. The species was noted in cereal and root crop plantations, winter oilseed rape, long-term red clover plantation. Category of threat: I – according to Warcholińska [1994], I – Trąba and Ziemińska [13], R – Fijałkowski and Nycz [1998].

8. *Agrostemma githago* L.: Zabłocie (GE 7023), Nowa Wieś (GE 7023), Czernięcin Poduchowny (FE 7923), Przedmieście Szczebrzeszyńskie (EE 7911), Guzówka Kolonia (FE 7900), Tokary (FE 7822), Olszanka (FE 7920). The species was frequent in the area. It was noted in winter and spring cereals as single specimens in quantity: r, +. Species ap-

peared on brown soils in the pH range of 5–7. Category of threat: V – according to Warcholińska [1994], I – Trąba and Ziemińska [1998], R – Fijałkowski and Nycz [1998].

9. *Fumaria officinalis* L.: Turobin (EE 7911), Żabno (FE 7912), Kol. Żabno (FE 7913), Gaj Czernięciński (FE 7933), Gródki Drugie (FE 7931). A great number of specimens of the rare species in agricultural crop fields, in quantity: 1, 2. Performed on brown soil with a pH of 6 in Gaj Czernięciński, of pH 7.5 in Gródki Drugie, at pH 7 in Żabno and on rendzinas in Turobin of pH 5 and of pH 4 in Kol. Żabno. The weed infested growing parsley, raspberry, poppy seeds, oats and tobacco. Category of threat: I – according to Warcholińska [1994], I – Trąba and Ziemińska [1998].

10. *Allium vineale* L.: Gaj Czernięciński (FE 7933), Kol. Żabno (FE 7912), Elizówka (FE 7900), Turobin (EE 7911). The species was noted in 6 specimens, in quantity: +, 1. Species located on brown soil with a pH of 6 in the village of Gaj Czernięciński, on rendzina at pH 7 and brown soil with a pH of 7 and 7.5 in Elizówka, on rendzina with a pH of 6 in Kol. Żabno and of pH 7 in Turobin. Rarely performed in the cultivation of vegetables, sugar beet, spring mix, triticale, winter wheat, spring barley. Category of threat: I – according to Trąba and Ziemińska [1998].

11. *Falcaria vulgaris* L.: Tarnawa Mała (FE 7910), Czernięcin Główny (FE 7923), Turobin (EE 7911), Zabłocie (GE 7023). Four localities of the species were noted, in brown soil of pH 4.5 in Czernięcin Główny at pH 7 in Tarnawa Mała, of pH 7 in Zabłocie and rendzina with a pH of 6.5 in Turobin. The weed infested tobacco, black current, and winter barley plantations, single specimens were, in quantity: r, +. Category of threat: I – according to Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

12. *Geranium dissectum* L.: Turobin (EE 7911), Żabno (FE 7912), Zagroble (FE 7921), Tarnawa Mała (FE 7910). The single specimens as accurring in quantity: r, +. The species was noted in rendzinas with at pH of 6.5 in Żabno and at pH of 5 in Turobin and in brown soil of pH 6 in Tarnawa Mała and at pH of 7 in Zagroble. The species was found in winter oilseed rape, spring wheat, tobacco and raspberries. Category of threat: V – according to Warcholińska [1994], I – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

13. *Galium spurium* L.: Żabno (FE 7912), Kol. Żabno (FE 7913), Czernięcin Poduchowny (FE 7923), Turobin (EE 7911). Registered taxon few specimens, in quantity: +. The species was noted in brown soils with at pH of 7 in Turobin, Żabno, Kol. Żabno and Czernięcin Poduchowny. It was found in spring wheat, spring cereal mixture, maize, and black currant plantations. Category of threat: I – according to Warcholińska [1994], I – Fijałkowski and Nycz [1998].

14. *Aspegugo procumbens* L.: Zabłocie (GE 7023), Przedmieście Szczebrzeszyńskie (EE 7911), Gródki Drugie (FE 7931). The species occurred as single in 5 specimens in several localities, in quantity: r. Species recorded on brown soils with a pH of 5.5 in the village Gródki Drugie, with a pH of 6, 6.5 and 7 in the Przedmieście Szczebrzeszyńskie and a pH of 7 in the Zabłocie. It is rare in the study area, although in some locations it was noted in plantations of raspberry, sugar beet, winter and spring wheat as well as in long-term red clover plantations. Category of threat: V – according to Warcholińska [1994], E – Zarzycki and Szeląg [2006], V – Fijałkowski and Nycz [1998].

15. *Papaver dubium* L.: Kol. Żabno (FE 7913), Żabno (FE 7912), Zagroble (FE 7921). A small number of specimens occurred in quantity: r, +. The species was lacated in brown soils with at pH of 7 in Zagroble, Żabno, Kol. Żabno. Was occurred in winter wheat, spring cereal mixture, and triticale canopies. Category of threat: I – according to Warcholińska [1994], R – Trąba and Ziemińska [1998], R – Fijałkowski and Nycz [1998].

16. *Veronica polita* FR: Żabno (FE 7912), Olszanka (FE 7920), Turobin (EE 7911). The species occurred in buckwheat, spring wheat, and triticale. Recorded a few specimens in quantity: +, 1. The species was noted on rendzina of pH 7 in Turobin and on brown soil of pH 7.5 in Żabno and of pH 7 in Olszanka. Appeared in buckwheat, spring wheat and triticale. Category of threat: V – according to Warcholińska [1994], I – Trąba and Ziemińska [1998].

17. *Adonis aestivalis* L.: Żabno (FE 7912), Zabłocie (GE 7023). Three localities of the species were recorded in two villages. The species occurred as single specimens in quantity: r. The species rendzina performed at pH 6.5 and 7.5 in the village Żabno and brown soil with a pH of 7 in the village of Zabłocie. The species inhabited canopies of winter wheat, spring oilseed rape and maize. Category of threat: V – according to Warcholińska [1994], V – Zarzycki and Szeląg [2006], V – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

18. *Fumaria vaillantii* LOISEL.: Żabno (FE 7912), Kol. Żabno (FE 7913). Single specimens were reported very rarely in oats, in quantity: r. The species was found in rendzinas with a pH of 4 in Kol. Żabno and at pH of 6.5 in Żabno. Category of threat: V – Warcholińska [1994], V – Trąba and Ziemińska [1998], R – Fijałkowski and Nycz [1998].

19. *Melampyrum arvense* L.: Elizówka (FE 7901), Żabno (FE 7912). Single specimens of the species were noted in winter wheat canopies, in quantity: r. The species located on rendzina with at pH of 7.5 in Żabno, and in brown soil at pH of 7 in Elizówka. Category of threat: V – according to Warcholińska [1994], V – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

20. *Neslia paniculata* (L.) DESV.: Zabłocie (GE 7023), Żabno (FE 7912). Single specimens were noted in quantity: r, +. The Species wad lacated in rendzinas with at pH of 6.5 in Żabno and in brown soils of pH 7 in Zabłocie. Species was occurred in plantations of wild mustard and spring cereal mixtures. Category of threat: I – according to Warcholińska [1994], I – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

21. *Stachys annua* L.: Żabno (FE 7912), Gródki Drugie (FE 7931). Few specimens were noted in quantity: r, +. Was found on rendzinas with at pH of 6.5 in Żabno and on brown soils at pH of 7 in Gródki Drugie. Species located in winter oilseed rape and spring cereal mixtures. Category of threat: V – according to Warcholińska [1994], V – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

22. *Aphanes arvensis* L.: Olszanka (FE 7920). Lokalized two specimens of single the species, in quantity: r. Species performed on brown soil with a pH of 6.5 and 7. Were found the occurred of the species in winter wheat and spring barley. Category of threat: I – according to Trąba and Ziemińska [1998].

23. *Camelina microcarpa* ANDRZ: Żabno (FE 7912). One locality of the species was found in a spring mixture of barley and oats, in quantity: +. Species performed on brown soil with a pH of 7. Category of threat: V – according to Warcholińska [1994], R – Trąba and Ziemińska [1998], V – Fijałkowski and Nycz [1998].

24. *Chaenorhinum minus* (L.) LANGE: Kol. Żabno (FE 7913), Guzówka Kolonia (FE 7900). Several localities of the species were noted in both villages; an inconsiderable number of specimens, in quantity: +. Was found on brown soil with a pH of 7 in spring and winter wheat canopies. Category of threat: R – according to Warcholińska [1994], R – Trąba and Ziemińska [1998], R – Fijałkowski and Nycz [1998].

25. *Centaurium pulchellum* L.: Tarnawa Mała (FE 7910). One locality of some specimens of the species, in quantity: +. Was found on a brown soils with a pH of 6.5 in

spring barley canopy. Category of threat: R – according to Warcholińska [1994], R – Fijałkowski and Nycz [1998].

26. *Cerinthe minor* L.: Żabno (FE 7912). Three localities of the taxon were reported from this village. The species occurred as single specimens, in quantity: r. Was found on rendzina with a pH of 6.5. Was noted in a winter wheat canopy. Category of threat: R – according to Warcholińska [1994], R – Trąba and Ziemińska [1998], R – Fijałkowski and Nycz [1998].

27. *Peplis portula* L.: Żurawie (FE 7922). Few specimens were noted in quantity: +, in raspberry plantations. Was occurred on brown soils with at pH of 6. Category of threat: R – Warcholińska [1994], R – Fijałkowski and Nycz [1998].

28. *Sherardia arvensis* L.: Żabno (FE 7912). One localities of the species in winter oilseed rape, a small number of specimens were found, in quantity: +. Species was found in rendzina of pH 6.5 in Żabno. Category of threat: V – according to Warcholińska [1994], V – Trąba and Ziemińska [1998], I – Fijałkowski and Nycz [1998].

29. *Thlaspi perfoliatum* L.: Żabno (FE 7912). The species was occurred on rendzina of pH 6.5. Several specimens of the species were noted in quantity: +, in wild mustard plantation. Categoty of threat: R – according to Warcholińska [1994], R – Trąba and Ziemińska [1998], R – Fijałkowski and Nycz [1998].

30. *Valerianella dentata* (L) POLLICH: Żabno (FE 7912). Substantial numbers of specimens were noted in spring cereal mixture canopies in quantity: 1. Was noted in brown soil of pH 7. Category of threat: I – according to Warcholińska [1994], I – Fijałkowski and Nycz [1998].

31. *Veronica agrestis* L.: Żabno (FE 7912). A small number of specimens in quantity: 1, were noted in spring barley. The species located in rendzina of pH 6. Category of threat: I – according to Trąba and Ziemińska [1998].

32. *Veronica opaca* L.: Żabno (FE 7912). Several specimens of the species in quantity: 1, were noted in a plantation of spring cereal mixture. The species located on brown soil of pH Category of threat: V – according to Warcholińska [1994], V – Fijałkowski and Nycz [1998].

Three of the presented species are described in the Red List of Vascular Plants [Zarzycki and Szeląg 2006]. There is include *Asperugo procumbens*, which have been categorized as extinct species. In turn, *Adonis aestivalis* and *Bromus secalinus* are regarded as endangered species. Moreover, five species are included in the Red List of Segetal Plants [Warcholińska 1994] in the rare species category. These are *Centaurium pulchellum*, *Cerinthe minor*, *Chaenorhinum minus*, *Peplis portula*, and *Thlaspi perfoliatum*.

DISCUSSION

In recent years, conservation of biodiversity has been more frequently considered at the regional level, and documentation of flora extinction and threat on a local scale has become increasingly necessary [Piękoś-Mirkowa 2003]. The phenomenon of flora impoverishment induced by anthropopressure has long been observed in Poland and across Europe [Májeková and Zeliberková 2005, Stehlik *et al.* 2007, Storkey *et al.* 2011, Skrzyczyńska and Ługowska 2006]. Increased intensification of agriculture and elimination of marginal habitats contribute to extinction of species that are characterised by narrow ecological amplitude or are associated with old agriculture [Davies *et al.* 2000,

Henle *et al.* 2004, Koh *et al.* 2004]. This process can be observed in Europe, e.g. in Switzerland, where comparison of the current lists of rare and endangered plant species with lists compiled ten years ago reveals substantial losses ranging from 21% to 38% [Stehlik *et al.* 2007]. Due to the intensification of agriculture and related changes in the way tillage, fertilization and plant protection major changes occur in the flora segetal [Májeková and Zeliberková 2005, Lososová and Simonová 2008]. Extensive and ecological farming promotes conservation of endangered and rare species [Storkey *et al.* 2011]. In ecologically managed farms, the biodiversity of weed communities in agricultural crops is by several tens of percent higher [Frieben and Köpke 1995, Frieben 1998, Hyvönen *et al.* 2003, Bengtsson *et al.* 2005]. Application of chemical fertilisers has a negative impact on the species composition in segetal communities [Májeková and Zeliberková 2005, Lososová and Simonová 2008]. Increased use of fertilisers eliminates large numbers of oligotrophic species in meadows [Schippers and Joenje 2002, Myklestad and Saetersdal 2004], and application of herbicides reduces the number of weeds in fields [Stehlik *et al.* 2007]. Changes in the number of ruderal weed species reflect the gradual loss of typical rural habitats caused by the increasing nutrient supply [Lososová and Simonová 2008]. Over the last decades, intensified farming has led to extinction of species inhabiting old culture landscapes [Chamberlain and Fuller 2000, Maes and Van Dyck 2001]. This can be illustrated by the example of *Asperugo procumbens* which according to the Red List of Vascular Plants is an endangered species in Poland [Zarzycki and Szeląg 2006]. The group of vulnerable plants comprises species whose presence is related to seed material purity; these are typical speirochores associated mainly with extensive farming. *Agrostemma githago* is a representative taxon regarded as an endangered species in Poland [Warcholińska 1994] and reported as a rare species in the Czech Republic [Fijałkowski and Nycz 1998, Lososová and Simonová 2008]. Similarly, *Bromus secalinus*, which has a status of an endangered species in the country and region, is a typical speirochore [Warcholińska 1994, Fijałkowski and Nycz 1998, Zając *et al.* 2009, Zarzycki and Szeląg 2006]. Currently, the species is reported from agricultural fields in eastern Poland [Kapeluszny and Haliniarz 2010, Rzymowska and Skrajna 2011]. In the area of the analysed commune, *Bromus secalinus* is a very common species. The group of endangered species comprises those associated with extreme, e.g. calcareous, habitats [Stehlik *et al.* 2007], for instance *Adonis aestivalis* and *Fumaria vaillantii*, which have been assigned the threatened with extinction category in the country [Warcholińska 1994]. *Melampyrum arvense* has also been included in the group of threatened taxa [Warcholińska 1994, Trąba and Ziemińska 1998, Jackowiak *et al.* 2007]. Also in the study area, a small number of specimens of the species occur in two localities only. *Lathyrus tuberosus* and *Consolida regalis* appeared to be common in the agricultural crop fields and roadsides of the Turobin commune area. Both species occur quite frequently in agricultural crops in some regions of the country as well [Skrzyczyńska and Rzymowska 2001, Skrzyczyńska and Ługowska 2006]. In contrast, according to Zarzycki and Szeląg [2006] and Zając *et al.* [2009], *Lathyrus tuberosus* is an endangered species in the country. According to Stehlik *et al.* [2007], even common species are threatened with extinction or they significantly reduce habitat richness. These authors report an extinction index for forest species, such as *Campanula rapunculoides* or *Melampyrum pratense*, and agrophytes, e.g. *Papaver rhoeas* or *Vicia tetrasperma* [Stehlik *et al.* 2007]. As reported by Warcholińska [1998], approximately 100 species of field weeds are

threatened with extinction in Poland and one in four species is threatened with extinction. Therefore, the necessity of conservation of weed biodiversity in traditional agriculture fields is being increasingly underlined. By signing the Convention on Biological Diversity, Poland acknowledged the obligation to preserve the country's natural wealth for future generations [Siciński 2001]. Conservation of species diversity of segetal weeds is necessary for economic, natural, aesthetic, and cultural reasons so that future generations will inherit Poland with all the richness and beauty of nature [Trzcińska-Tacik 2003].

CONCLUSIONS

1. Three of the species analysed in the study area are included in the Red List of Vascular Plants, i.e. *Asperugo procumbens* which have been assigned the category of extinct species, and *Adonis aestivalis* and *Bromus secalinus*, regarded as threatened with extinction.

2. In the group of the analysed species, five are included in the Red List of Segetal Plants in the category of rare species, i.e. *Centaurium pulchellum*, *Cerinthe minor*, *Chaenorhinum minus*, *Peplis portula*, and *Thlaspi perfoliatum.*

3. The study showed that *Bromus secalinus*, *Campanula rapunculoides*, *Centaurea cyanus*, *Consolida regalis*, *Lathyrus tuberosus*, and *Papaver rhoeas* they are frequent, common and very common in the area of the study area.

REFERENCES

Bengtsson J., Ahnström J., Weibull A.C., 2005. The effects of organic agriculture on biodiversity and abundance: a meta-analysis. J. Appl. Ecol. 42, 261–269.

Chamberlain D.E., Fuller, R.J., 2000. Local extinction and changes in species richness of lowland farmland birds in England and wales in relation to recent changes in agricultural land-use. Agr. Ecosyst. Environ. 78, 1–17.

Davies K.E., Margules C.R., Lawrence K.F., 2000. Which traits of species predict population declinesin experimental forest fragments? Ecology 81, 1450–1461.

Dembek W., Liro A., 2001. Ochrona i kształtowanie różnorodności biologicznej i krajobrazowej obszarów wiejskich. Woda Śr. Obsz. Wiej. 1(2), 7–26.

Falińska K., 1996. Ekologia roślin. PWN, Warszawa, 277–339.

Fijałkowski D., Nycz B., 1998. Zagrożone gatunki roślin segetalnych na Lubelszczyźnie. Acta Univ. Lodz., Folia Bot. 13, 199–208.

Fijałkowski D., 2003. Ochrona przyrody i środowiska na Lubelszczyźnie. Wyd. LTN, 408.

Frieben B., Köpke U., 1995. Effect of farming systems on biodiversity. W: J. Isart, J.J. Llerenea (eds.), Biodiversity and Land Use: The Role of Organic Farming, Proceedings of the first ENOF Workshop, Bonn, 11–21.

Frieben B., 1998. Organic farming as a sustainable system – biodiversity in fields. In: N. El Bassam, R.K. Behl, B. Prochnow (eds.), Sustainable Agriculture for Food, Energy and Industry. Vol. I. Proceedings International Conference Sustainable Agriculture for Food, Energy and Industry, James & James Ltd., London, 603–608.

Harasimowicz S., Kostrubiec A., 2005. Ocena punktowa waloryzacji przyrodniczej obszarów o charakterze naturalnym (na terenach wiejskich). Zesz. Nauk. AR w Krakowie, Geodezja 21(417), 145–152.

Henle K., Davies K.F., Kleyer M., Margules C., Settele J., 2004. Predictors of species sensitivity to fragmentation. Biodivers. Conserv. 13, 207–251.

Hyvönen T., Ketoja E., Salonen J., Jalli H., Tiainen J., 2003. Weed species diversity and community composition in organic and conventional cropping of spring cereals. Agr. Ecosyst. Environ. 97, 131–149.

Jackowiak B., Celka Z., Chmiel J., Latowski K., Żukowski W., 2007. Red list of vascular flora of Wielkopolska (Poland). Biodiv. Res. Conserv. 5–8, 95–127.

Kapeluszny J., Haliniarz M., 2010. Ekspansywne i zagrożone gatunki flory segetalnej w środkowo-wschodniej Polsce. Annales UMCS, sec. E., Agricultura 65(1), 26–33.

Koh L.P., Sodhi N.S, Brook B.W., 2004. Ecological correlates of extinction proneness in tropical butterflies. Conserv. Biol. 18, 1571–1578.

Kornaś J., 1987. Zmiany roślinności segetalnej w Gorcach w ostatnich 35 latach. Zesz. Nauk. UJ 834 Prace Bot. 15, 7–26.

Kuszewska K., Fenyk M.A., 2010. Różnorodność biologiczna w krajobrazie rolniczym. Acta Sci. Pol., Adm. Locorum 9(1), 57–67.

Lososová Z., Simonová D., 2008. Changes Turing the 20th Century in species Composition of synantrophic vegetation in Moravia (Czech Republic). Preslia 80, 291–305.

Maes D., Van Dyck. H., 2001. Butterfly diversity loss in Flanders (north Belgium): Europe's worst case scenario. Biol Converv. 99, 263–276.

Májeková J., Zeliberová M., 2005. Reassessment of rareness and threat of segetal plant species in the Borská nížina Lowland. Institute of Botany SAS. In: Threatened Weedy Plant Species. Book of proceedings from the International Scientific Conference. Slovak University of Agriculture in Nitra, Slovakia, 29–35.

Michałowski A., 2003. Koncepcja metody oceny działań na rzecz zachowania różnorodności biologicznej na etapie programowania rozwoju jednostek organizacyjnych. Ekon. Śr. 1(23), 178–191.

Myklestad A., Saetersdal M., 2004. The importance of traditional meadow management techniques for conservation of vascular plant species richness in Norway. Biol Conserv. 118, 133–229.

Piękoś-Mirkowa H., 2003. Zagrożenie różnorodności biologicznej flory Polski w świetle regionalnych „czerwonych list". Instytut Ochrony Przyrody. PAN, Kraków.

Rzymowska Z., Skrajna T., 2011. Segetal flora in the Łuków plain. Acta Agrobot. 64(2), 93–108.

Schippers P., Joenje W., 2002. Modelling the effect of fertilizer, mowing, disturbance and width on the biodiversity of plant communities of field boundaries. Agr. Ecosyst. Environ. 93, 351–365.

Siciński J.T., 2001. Gatunkowa różnorodność biologiczna chwastów segetalnych i jej zagrożenia w Polsce. Acta Univ. Lodz., Folia Bot. 16, 73–86.

Skrzyczyńska J., Rzymowska Z., 2001. Flora segetalna Podlaskiego Przełomu Bugu. Acta Agrobot. 54(1), 121.

Skrzyczyńska J., Ługowska M., 2006. Rzadkie gatunki segetalne wschodniej części Doliny Środkowej Wisły. Fragm. Flor. Geobot. Polonica 13 (1), 11–15.

Stehlik I., Caspersen J.P., Wirth L., Holderegger R., 2007. Swiss lowlands: environmental determinants of local plant extinction in a per-urban landscape. J. Ecol. 95, 734–744.

Storkey J., Mayer S., Still K.S., Leuschner C., 2011. The impact of agricultural intensification and land-use change on the European arable flora. Proc. R. Soc. B. 1–9.

Stupnicka-Rodzynkiewicz E., Stępniak K., Dąbrowska T., Łabza T., 2004. Różnorodność zbiorowisk chwastów w uprawach zbóż w Beskidach. Fragm. Agron. 4 (84), 45–54.

Trąba C., Ziemińska M., 1998. Stan gatunków chwastów segetalnych uważanych za zagrożone w otulinie Roztoczańskiego Parku Narodowego (State of threatened segetal species in the surrounding area of the Roztocze National Park). Acta Univ. Lodz. Folia Bot. 13, 265–272.

Trąba Cz., Ziemińska-Smyk M., 2006. Różnorodność florystyczna zbiorowisk chwastów w uprawach roślin okopowych otuliny Roztoczańskiego Parku Narodowego. Pam. Puł. 14, 195–206.

Trzcińska-Tacik H., 2003. Znaczenie różnorodności gatunków chwastów segetalnych. Pam. Puł. 134, 253–262.

Warcholińska A.U., 1994. List of threatened segetal plant species in Poland. In: S. Mochnackỳ, A. Terpó (eds.), Anthropization and the environment of rural settlements flora and vegetation. Proceedings of International Conference. Sátoraljaújhely, 22–26 August 1994, 206–219.

Warcholińska A.U., 1998. Właściwości zagrożonych segetalnych roślin naczyniowych Polski. Acta Univ. Lodz., Folia Bot. 13, 7–14.

Zając M., Zając A., Tokarska-Guzik B., 2009. Extinct end endangered archeophytes and the Dynamics of their diversity in Poland. Biodiv. Res. Conserv. 13, 17–24.

Zarzycki K., Trzcińska-Tacik H., Różański W., Szeląg Z., Wołek J., Korzeniak U., 2002. Ecological Indicator Values of Vascular Plants of Poland. Biodiversity of Poland. Kraków, 19–123.

Zarzycki K., Szeląg Z., 2006. Czerwona lista roślin naczyniowych w Polsce. In: Mirek Z., Zarzycki K., Wojewoda W., Szeląg Z. (eds.): Czerwona lista roślin i grzybów w Polsce. Instytut Botaniki im. W. Szafera PAN, Kraków, 9–20.

Streszczenie. Celem badań była inwentaryzacja oraz opis stanowisk interesujących gatunków występujących w zbiorowiskach segetalnych gminy Turobin, uznanych w Polsce i Europie za zagrożone wyginięciem. W pracy przedstawiono wyniki badań terenowych prowadzonych w latach 2011–2013 w uprawach rolniczych, na glebach brunatnych i rędzinach. W miejscu występowania fitocenoz z udziałem interesujących i zagrożonych gatunków wykonywano zdjęcie fitosocjologiczne metodą Brauna-Blanqueta. Do oceny siedliska wykorzystano mapy glebowo-rolnicze, w miejscu wykonania zdjęcia zbadano pH gleby. Na terenie badań gminy Turobin stwierdzono występowanie 32 interesujących gatunków, niektóre z nich uznane są za rzadkie i zagrożone wyginięciem na terenie Polski. Wśród tej grupy na uwagę zasługuje *Asperugo procumbens*, który znajduje się na czerwonej liście roślin naczyniowych jako gatunek wymierający.

Słowa kluczowe: gatunki ginące, uprawy rolnicze, gmina Turobin