

INVENTORY OF WILD SERVICE TREE, *SORBUS TORMINALIS* (L.) CRANTZ, IN THE TACZANÓW FOREST INSPECTORATE

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Abstract. The aim of this paper was inventory of the wild service tree (*Sorbus torminalis*), a very precious but, at the same time, one of the least known species of homeland wooded plants in the Taczanów Forest Inspectorate (Poznań Regional State Forest Directorate). The inventory was conducted from May 2010 to March 2011. The result of the inventory are 1127 specimens, of which 209 are strong mature trees and 918 are seedlings and young trees in good health. The field research shows that the wild service tree grows in the Taczanów Forest alongside its central and eastern part in 22 Forest Compartments, 8 of which are in the Koryta Forest District and 14 are in the Taczanów Forest District. The average height of mature trees ($d_{1.3} > 10$ cm) was 18.02 meters and the average breast height dimension was 26.22 centimetres. The dominant forest type in this area which is acid oak forest from *Quercetea roboli-petraeae* class creates optimal conditions for the growth of the wild service tree. This is proved by an analysis of the species population dynamics which is characteristic for the species biology. The study shows that earlier inventories conducted in this region are incomplete and out-of-date, and this present inventory substantially broadens the knowledge about the wild service tree in the Taczanów Forest in the context of its local and national population.

Key words: *Sorbus torminalis*, inventory, acid oak forests of *Quercetea roboli-petraeae* class

INTRODUCTION

The wild service tree (*Sorbus torminalis*) is a precious and, at the same time, one of the least known species of homeland wooded plants. Its range covers western, southern and central part of Europe. Additionally, the species occurs in Northwest Africa and in Southwest Asia [Kutzelnigg 1995]. In Poland it can be found mainly in western part of the country (in the region of Great Poland, Pomerania, the Sudety Foothills and in a separate stand in the Island Beskids) and its sites are poor and scattered [Browicz and Gostyńska-Jakuszczyńska 1966].

Although *Sorbus torminalis* has been in the focus of scientist interests for a long time, so far we have lacked a full count of the species' stands.

In some of the studies on the wild service tree, the data on its distribution have been copied for many years and sometimes they are already out of date. This also refers to local studies on distribution of the species [Czarna 1999, Goetz 1928, Szeszycki 2008], to which the present publication is supplementary.

The purpose of this paper is to take inventory of the wild Service Wood (*Sorbus torminalis*) in the Taczanów Forest Inspectorate (Regional Directorate of State Forests) as well as, to identify the population and growth tendencies of the species.

MATERIAL AND METHODS

The study was carried out in the Koryta and Taczanów Forest Districts, on the territory of the Taczanów Forest Inspectorate, located in the southern part of the Wielkopolska voivodeship, within the area of the Regional Directorate of State Forests in Poznań. The inventory of the wild service tree covered a forest spreading between the Koryta and Taczanów Forest Districts, called the Taczanów Forest, with the surface area of approximately 1400 ha (length = ca. 6 km, width = ca. 4 km) [Czarna 1999].

The inventory was conducted in the period from May 2010 to March 2011. Before commencing the count, assumption had been made to divide the trees into mature and young specimens (the division is artificial but it was necessary due to a high number of specimens planted artificially, in compartment 238, that had a significant impact on the research results, additionally, due to a lack of data on the trees' age, rough age estimates were used). A distinctive criterion was the trunk diameter ($d_{1,3} < 10$ cm – young trees, $d_{1,3} > 10$ cm – mature trees).

The following tree parameters were measured:

- diameter (using a calliper, accuracy to 1 cm; breast height dimension structure was determined for a 2-cm thickness class, the measurement covered all *Sorbus torminalis*, exclusive of young specimens)
- height (using a Suunto clinometer, accuracy to 1 m for mature trees; using a measuring tape, accuracy to 5 cm for young specimens; height structure was determined for 5-cm height class with the exception of young specimens).

The health state of each specimen was assessed based on a modified Kamiński and Czerniak's scale [2000]. Trees were classified into six classes:

- Class 5: fully healthy trees, declining share – insignificant, resulting from species-specific features and age, up to ca. 5% of the crown, the habit – correct, no necessity of care treatments; slight spot trunk damages – healing and having no significant effect on the condition of the tree.
- Class 4: trees with declining share of up to 15% of the crown, necessity to perform slight care cuts, the crown typical for the species, slight necrosis of the assimilation apparatus; trunk damages and necrosis – small and healing, scarred up frost cracks, small hollows not infected by fungi.
- Class 3: trees with declining share of up to 25% of the crown, broken branches, explicit necrosis of the assimilation apparatus, premature loss of leaves, necessity to perform serious care cuts; quite large damages to and necrosis of bark and wood (maximum of up to ¼ of the perimeter) but not constituting a significant

threat to the tree's life, shallow and small hollows, frost and thunder cracks, signs of infection with fungi, serious defects caused by attack of insects.

- Class 2: trees with declining share of up to 35% of the crown, serious necrosis of leaves; large damage to the trunk (up to ½ of the perimeter), deep and large hollows, necrosis, explicit fungus infection; necessity to perform immediate and serious care treatments.
- Class 1: trees with declining share of over 35% of the crown, serious necrosis of leaves; damages to the trunk exceeding ½ of the perimeter, very extensive and deep hollows, necrosis, serious fungus infection; dying trees.
- Class 0: dead trees.

Each inventoried wild service tree was classified into a relevant layer:

A₁ – trees with the height of 30 to 16 m (the tallest trees)

A₂ – trees with the height of 15 to 6 m (shorter trees)

B – trees with the height of 5 to 1.6 m (bushes)

C₁ – trees with the height of 1.5 to 1 m (young trees)

C₂ – trees with the height of up to 1 m (seedlings and the youngest trees).

For each compartment a percentage cover of the surface area with wild service trees was assessed using the following scale:

- 1 (0.1-5%)
- 2 (5-25%)
- 3 (25-50%)
- 4 (50-75%)
- 5 (75-100%).

In the period from May to June flowering of *Sorbus torminalis* was assessed according to a 3-stage scale: abundant flowering, poor flowering or lack of flowering.

RESULTS AND DISCUSSION

A map presented below (Fig. 1) illustrates the location of compartments in which *S. torminalis* specimens were inventoried. The particular stands are marked with relevant colours depending on the category of trees found in a given area.

Based on the data referring to the breast height diameter – BHD (Table 1, Table 2), the height (Fig. 2), the flowering (Fig. 3) and the health (Fig. 4) we can conclude that the analysed population of *Sorbus torminalis* is dominated by young trees. This is proved by the fact that the thickest specimens (with BHD amounting from 52 to 54 cm and from 49 to 51 cm) account merely for 0.90% of the total of the wild service trees and the most numerous group is made up of the trees with BHD from 22 to 24 cm.

Distribution according to the tree's height is similar: the tallest trees (with the height from 25.1 to 30 m) constituted the lowest share: 2.36%, while trees with the height of 15.1 to 20 m and 20.1 to 25 m were found most often (and constituted in total 66.04%).

The research shows that 39.15% of *S. torminalis* trees did not flower at all and 26.42% of the trees were characterised by poor flowering. This leads us to a thesis that a significant number of the trees are at a stage before the first flowering, which means, according to Bednorz [2010], they are under 15 years old.

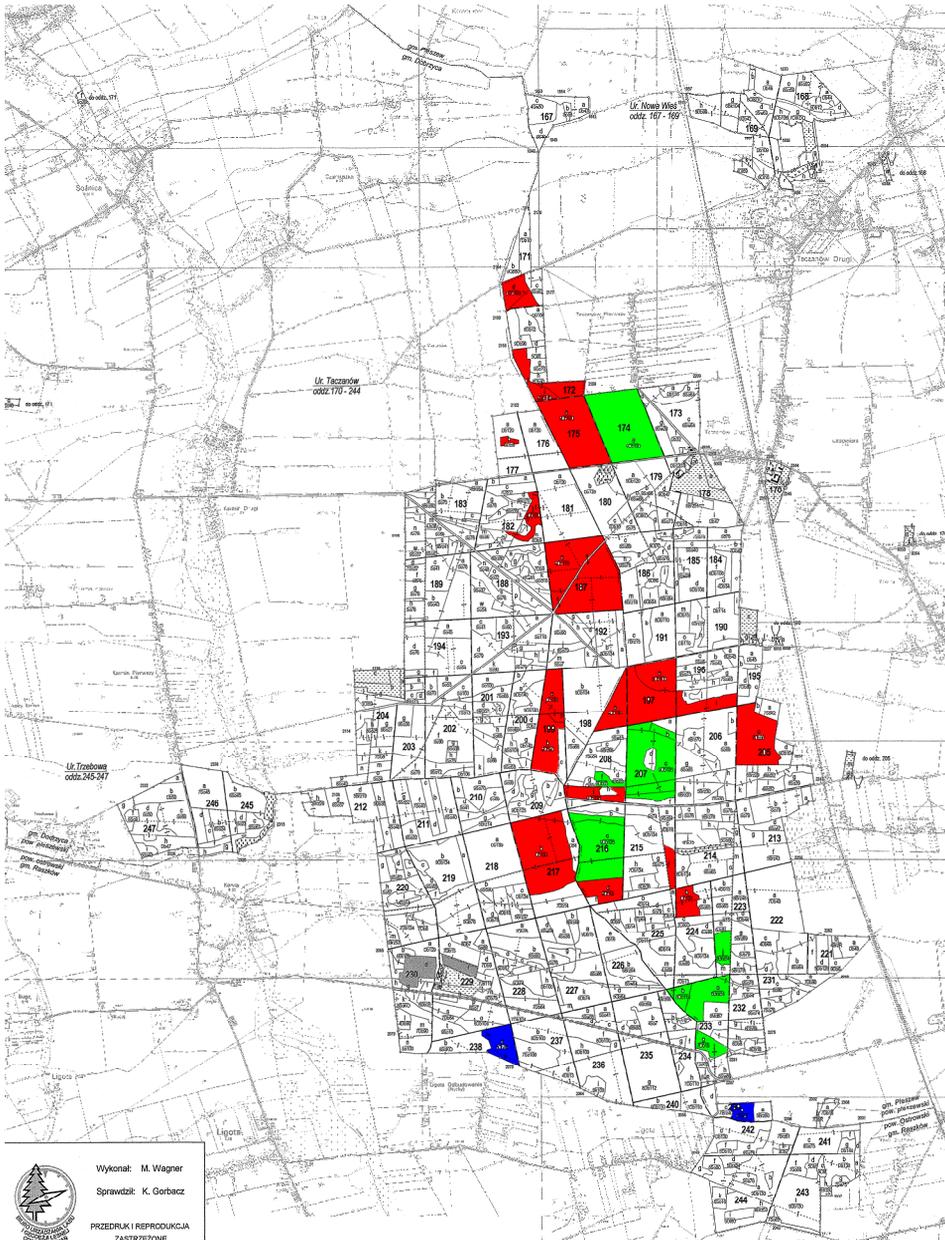


Fig. 1. Distribution of *Sorbus torminalis* in the Taczanów Forest: red – forest compartment with mature trees, green – forest compartment with mature trees mixed with young trees, blue – forest compartment with young trees from artificial planting

Rys. 1. Rozmieszczenie *Sorbus torminalis* w Lesie Taczanowskim: czerwony – wydzielania z drzewami starszymi, zielony – osobniki starsze występujące wspólnie z młodszymi, niebieski – młode osobniki pochodzące z odnowienia sztucznego

The health state of the wild service trees growing in the Taczanów Forest is in most cases good or very good. As much as 81% of the specimens were classified into the highest class of vitality, i.e., class 4 and 5, which proves that these are young and vital trees.

The dynamic structure of the wild service trees population (a share of the trees in the particular forest layers) presented in Figure 5 is basically correct and consistent with the species biology. The only deviation is a higher than average share of the youngest specimens from layer C₂. This can be however explained by quite high artificial planting (800 items) which took place in 2010 in compartment 238a.

Table 1. *Sorbus torminalis* by thickness class at forest districts – part 1

Tabela 1. *Sorbus torminalis* według klas grubości w poszczególnych leśnictwach – część 1

Forest district Leśnictwo	Thickness class, cm – Klasa grubości, cm								
	10-12	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36
Koryta, %	4.23	0.47	4.23	4.70	5.67	3.30	3.30	0.94	0.95
Taczanów, %	3.77	4.73	5.17	4.70	8.03	8.00	9.90	8.46	4.75

Table 2. *Sorbus torminalis* by thickness class at forest districts – part 2

Tabela 2. *Sorbus torminalis* według klas grubości w poszczególnych leśnictwach – część 2

Forest district Leśnictwo	Thickness class, cm – Klasa grubości, cm							
	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
Koryta, %	0.47	0.94	0.47	0.00	0.00	0.45	0.00	0.00
Taczanów, %	4.23	3.76	2.33	0.52	0.90	0.45	0.00	0.00

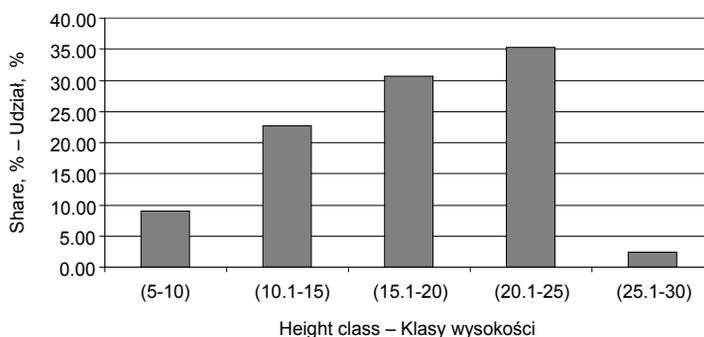


Fig. 2. *Sorbus torminalis* – height structure

Rys. 2. Struktura wysokości *Sorbus torminalis*

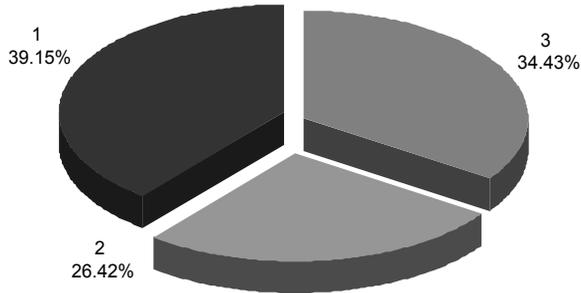


Fig. 3. *Sorbus torminalis* – state of flowering: 1 – lack of flowers, 2 – poor flowering, 3 – abundant flowering
 Rys. 3. Stan kwitnienia *Sorbus torminalis*: 1 – brak, 2 – słabe, 3 – dobre

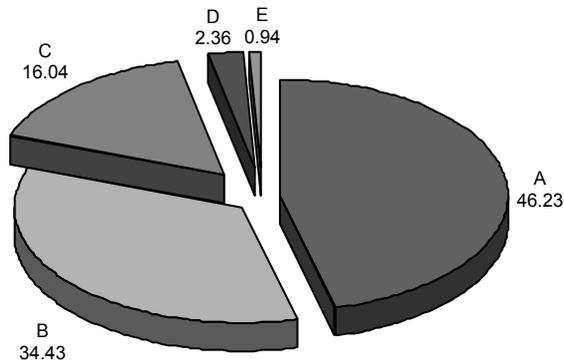


Fig. 4. *Sorbus torminalis* – state of health: A – class 5, B – class 4, C – class 3, D – class 2, E – class 1
 Rys. 4. Stan zdrowotny *Sorbus torminalis*: A – 5 klasa, B – 4 klasa, C – 3 klasa, D – 2 klasa, E – 1 klasa

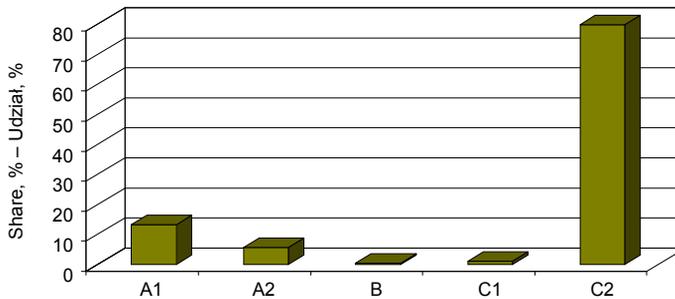


Fig. 5. Dynamic structure *Sorbus torminalis*: A1 – the tallest trees, A2 – shorter trees, B – bushes, C1 – young trees, C2 – seedlings and the youngest trees

Rys. 5. Dynamika populacji *Sorbus torminalis*: A1 – drzewa najwyższe, A2 – drzewa niższe, B – krzewy, C1 – młode drzewa, C2 – siewki i młodsze osobniki

SUMMARY

Our research shows the occurrence of the wild service tree alongside the central and eastern part of the Taczanów Forest, with the biggest number of specimens in the following compartments: 207 (79 items), 223 (26 items), 233 (21 items), 196 (13 items), 216 (13 items), 174 (11 items), 197 (10 items) and 238 (800 items – artificial planting).

The number of inventoried trees is 1127, of which 908 trees grow in the Koryta Forest District (including 64 mature and 844 young specimens), and 219 – in the Taczanów Forest District (including 148 mature and 71 young specimens).

As we can see in the map above (Fig. 1) the area under analysis comprises more compartments (marked with red) where mature specimens of the wild service tree are found. While there are fewer compartments in which mature trees grow together with young specimens (compartments marked with green) and such where the wild service trees came from artificial planting (compartments marked with blue).

Summing up, the habitat conditions in the Taczanów Forest, as well as a proper selection of compartments for planting of the wild service tree, are optimal for the species and therefore its population is characterised by very good quality, growth and health features. In addition, its stands receive special attention from the Forest Service employees who create ecological and conservation zones on the wild service tree sites, excluding them from economic activity.

REFERENCES

- Browicz K., Gostyńska-Jakuszczyńska M., 1966. *Sorbus torminalis* (L.) Crantz – Jarząb brekinia (Brząk), 5 [*Sorbus torminalis* (L.) Crantz – Wild service tree]. In: Atlas rozmieszczenia drzew i krzewów w Polsce. Eds S. Białobok, Z. Czubiński. Wyd. Nauk. PWN Warszawa [in Polish].
- Bednorz L., 2010. Jarząb brekinia *Sorbus torminalis* (L.) Crantz w Polsce [Wild service tree *Sorbus torminalis* (L.) Crantz in Poland]. Bogucki Wyd. Nauk. Poznań [in Polish].
- Czarna A., 1999. Materiał do flory naczyniowej Lasu Taczanowskiego koło Pleszewa [Material for vascular flora of the Taczanów Forest near Pleszew]. Kat. Bot. Uniw. Przyr. Poznań [typescript; in Polish].
- Goetz J., 1928. Rozmieszczenie brekinii (*Sorbus torminalis* Crantz) w Polsce zachodniej [Distribution of *Sorbus torminalis* Crantz in western Poland]. Kosmos 53, 71-101 [in Polish].
- Kamiński B., Czerniak A., 2000. Badanie drzewostanów oraz sporządzenie opinii naukowej kwalifikującej do stworzenia wykazu inwentaryzacyjnego starych, cennych drzew na terenie miasta Poznania [Examination of forest stands and preparation of a scientific opinion qualifying for making an inventory list of mature, precious trees on the territory of the city of Poznań]. Kat. Inż. Leśn. Uniw. Przyr. Poznań [typescript; in Polish].
- Kutzelnigg H., 1995. *Sorbus*. In: Illustrierte Flora von Mitteleuropa. Ed. G. Hegi. Blackwell Berlin, 328-385.
- Szeszycki T., 2008. Jarząb brekinia – *Sorbus torminalis*. Historia, hodowla, ochrona, przyszłość [Wild service tree – *Sorbus torminalis*. History, cultivation, protection, future]. Soft Vision Mateusz Rajski [in Polish].

INWENTARYZACJA JARZĘBU BREKINII (*SORBUS TORMINALIS* (L.) CRANTZ) W NADLEŚNICTWIE TACZANÓW

Streszczenie. Celem pracy było zinventaryzowanie zasobów jarzębu brekinii – bardzo cennego, a zarazem jednego z najmniej znanych gatunków rodzimej dendroflory – na terenie Nadleśnictwa Taczanów (RDLP Poznań). W okresie od maja 2010 roku do marca roku następnego przeprowadzono inwentaryzację *Sorbus torminalis*. Na badanym obszarze stwierdzono występowanie 1127 osobników *S. torminalis* z czego 209 to dorodne drzewa w starszym wieku, a 918 to siewki i młodsze brzęki w równie dobrej kondycji zdrowotnej. Na podstawie badań terenowych można stwierdzić, że brekinia w Lesie Taczanowskim występuje wzdłuż jego centralnej i wschodniej części, na obszarze 22 oddziałów, z czego 8 znajduje się w Leśnictwie Koryta, a 14 w Leśnictwie Taczanów. Przeciętna wysokość osobników starszych ($d_{1,3} > 10$ cm) wynosiła 18,02 metra, a pierśnica 26,22 centymetra. Dominujące na badanym terenie acidofilne lasy dębowe z klasy *Quercetea robori-petraeae* stwarzają dogodne warunki do wzrostu i rozwoju brzęka, co potwierdza analiza dynamiki populacji, która jest charakterystyczna dla biologii gatunku. W porównaniu z wcześniej przeprowadzonymi ewidencjami można zauważyć ich niekompletność i nieaktualność, dlatego też praca ta jest dobrym uzupełnieniem wszelkich danych dotyczących gatunku zarówno w odniesieniu do lokalnej populacji, jak i w skali całego kraju.

Słowa kluczowe: *Sorbus torminalis*, inwentaryzacja, acydofilne lasy dębowe z klasy *Quercetea roboli-petraeae*

Accepted for print – Zaakceptowano do druku: 24.06.2013

For citation – Do cytowania: Duda M., Calka A., 2013. Inventory of Wild Service Tree, *Sorbus torminalis* (L.) Crantz, in the Taczanów Forest Inspectorate. *Acta Sci. Pol., Silv. Colendar. Rat. Ind. Lignar.* 12(2), 5-12.