

APPLICATION OF SHEEP WOOL IN PREVENTING DAMAGE CAUSED BY DEER IN YOUNG FOREST PLANTATIONS

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Abstract. The aim of this study was to test the effectiveness of sheep wool used as a repellent to protect forest plantations against damages caused by browsing deer. The analysis involved forest plantations protected with the wool of Wrzosówka sheep as well as other plantations. The degree of damage was determined according to documented percentage of damaged plants: up to 20%, from 21 to 50% and more than 50% of damaged shoot tops. In the forest plantations that were unprotected with wool, the surface of deer-made damages increased from year to year, from 60.6 ha in 2008 to 272.71 ha in 2011. The damages were varied in terms of degree and number of damaged shoots of the seedlings. Application of sheep wool in forest plantation protection may represent an alternative to noxious chemicals.

Key words: sheep wool, forest plantations, repellent

INTRODUCTION

Large populations of cervids may result in damages to young forest plantations, and also in classes of older trees [Haze 2012]. Shoot biting is the case mainly in younger, 1–4 year plantations. Damages are inflicted throughout a year of deer foraging, although their particular outbreak takes place during autumn and winter, when the earth is covered with snow and food shortages are most severe. Shoots are bitten in a characteristic way, being abruptly ripped off, as the animals lack incisor teeth in the mandible, and thus damaged are the apical and lateral

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shoots as well as the leaves or needles. In older shrubs or trees, thicker shoots are crushed with the molars. Young, still poorly rooted seedlings are often plucked out with a bite [Haber 1961, Dominik 1977].

The methods of protecting forest plantations against foraging animals, according to the Forest Protection Instruction [Haze 2012], can be classified as indirect, ie. improving the living conditions of the animals, and direct ones, that is active forest protection, which – depending on the agent used – may be mechanical or chemical methods. The mechanical methods involve:

- fences, which are efficient though expensive,
- cutting the bark of spruce and pine to let some resin flow out,
- individual tree wraps and screens made of various materials.

Chemical methods include repellents or chemicals of an unpleasant smell, taste, which drive the deer away from the protected shoots. Application of chemicals, however, may involve a risk of animal poisoning. Therefore, only registered chemical repellents should be used in accordance with the instructions [Dominik 1977, Pruszyński and Wolny 2009, Haze 2012].

There is little information on sheep wool used as a protection measure against foraging deer damaging forest plantations. Forest Inspectorate Międzychód has been using this method for more than 10 years with good results. Additional advantage of wool is its relatively low price, which ranges from 3 to 6 PLN per kg. It should also be noted that this method of forest protection against animal damages is financially supported with the amount of 280 PLN per 1 ha of protected area for 1 year [Ordinance of the Ministry of Agriculture and Rural Development of 19 March 2009]. Thus, this environment-friendly method using wool to protect young shoots against animal eating may also be cost effective. It may represent an alternative to substances noxious applied for this purpose, which may harm the environment. This is especially important in terms of afforestation, when plantations are planted in new forest areas; these must be maintained in a proper condition to obtain the afforestation grant.

The aim of the study was to test the effectiveness of sheep wool as a repellent used in the protection of young forest plantations against browsing by deer.

MATERIAL AND METHODS

We used records of the Forest Inspectorate Międzychód dealing with the measures taken in order to protect forest plantations and the area of the protected plantations. We also obtained lists of damages which depicted the size and extent of the damages in the forest plantations as a result of gnawing by deer (the entire Forest Inspectorate Międzychód).

The Forest Inspectorate Międzychód belongs to the Wielkopolsko-Pomorska nature-forest region, districts Kotlina Gorzowska (the area of Międzychód and Krobielewko) and Lubuskie Lakeland (area Gorzyń) [Trampler et al. 1990].

The habitat structure of the forest under the management of the Inspectorate is mainly represented by fresh coniferous forest (66.1%). The share of coniferous habitats in the Inspectorate reaches 83.8%, whereas wet, boggy habitats and alder carrs represent only 2.6%. The species composition of the forest stands is strongly dominated by the pine (91.7%). The forest stands are mostly in the class IV of age.

In terms of hunting management, the Międzychód Inspectorate area is divided into 8 leased hunting districts (4 forest and 4 field). Game present in the area include mainly red deer, roe deer, wild boar and fox.

The analysis involved young forest plantations protected with sheep wool and other plantations in the entire are Forestry Inspectorate Międzychód in the years 2008–2011 which were not protected, also due to high costs of such protection measures. The assumed degree of damage was in line with the damage documentation:

- up to 20% of top shoots damaged,
- from 21 to 50% of top shoots damaged,
- more than 50% of top shoots damaged.

In order to protect the trees, tufts of sheep wool were delicately wound around the leading shoots, without excessive tightness that would lead to deformations of the bud or shoot, however, enough firmly to keep the wool in place even under wind, rain, snow, or accidental knocking off. For this purpose, the wool of Wrzosówka sheep was used.

The results are shown in Tables and in the form of bar graphs illustrating the size of the damage caused in the plantations protected with Wrzosówka sheep wool and other plantations together.

RESULTS AND DISCUSSION

As can be seen from the data presented in Table 1, the are of unprotected forest plantations increased from year to year, from 60.6 hectares (2008) to 272.71 hectares (2011). The damages varied depending on the number of damaged shoots of the seedlings (Fig. 1). Within the total damaged area, most frequent were damages that did not exceed 20% of shoots. In 2010–2011, the degree of damages was more varied. In 2010, unprotected plantations were damaged on 130 areas, which was probably due to a severe winter. Besides a higher number of damages, an increased intensity of grazing was observed on particular trees, which fell within the category of more than 50% of damaged shoots and represented 19.21 ha

(7.9%); on the other hand, the 21–50% shoot-damage category trees occupied the area 64.90 ha (approx. 27%). The total area of unprotected plantations damaged in 2011 reached 272.71 ha. In the category up to 20% of damaged shoots, the area damaged by deer represented 77.1% (210.27 ha), followed by the 21–50% shoot-damage category on 59.64 ha, and 2.8 ha of the area with 50% of damaged shoots or more (Table 1, Fig. 1).

Applying sheep wool to protect seedlings also make the deer graze on the surrounding grass rather than on the young shoots, which is a positive effect, since a fast-growing grass compete for light against young trees and seedlings [Dominik 1977]. Intensive growth of grass in young forest plantations has a negative impact also in terms of precipitation water present in the upper layers of the soil. Hence, the fact that grazing deer has an access to open young plantations reduces labor consumption, as there is no need to mow the grass, which is otherwise necessary in fenced plantations.

If sheep wool is supposed to play a role of a repellent, it cannot a processed product in any way and must retain its original smell. Raw wool has its specific smell, which is immediately sensed by deer from a short distance, causing the animals to avoid the protected trees [Borys 2012]. The fleece of long-wool and primitive breeds is best for the purpose, because of the way the wool is usually fastened to the shoots. Long wool tufts can be properly attached to the needles or leaves by wrapping the shoots gently, so as to prevent it from being blown away by the wind, dragged away by passing animals, or damaged by snow, rain or hail (Phot. 1).

As it is shown in Table 2 and Figure 2, only minor damages were caused by deer in the plantations protected with sheep wool, 2.79%, 3.15% and 11.71% in 2008, 2009 and 2011, respectively. In 2010, however, as much as 29.17 ha of 59.13 ha, or nearly 50% of wool-protected forest plantation areas were damaged by deer. This may have been due to the severe winter of 2009/2010, which forced the animals to concentrate. The snow cover was so thick that the deer were unable to forage on herbaceous plants and began feeding on shoots. As a result, damages on the plantations were both more severe and more extensive, which can be concluded from Figure 2. In 2010, the damages of more than 50% of apical shoots of the seedlings were found on 22.28 hectares, or 77% of all damages, whereas such degree of damages were not observed in 2008 and 2009, and only in a low proportion, about 3%, in 2011.

The report by Borys [2012] presents several measures which were supposed to protect plants against farm animals. According to the authors, sheep wool, as a natural repellent against farm animals is very well suited for this role, which is promising for the possible use of it on a larger scale. The authors also mentioned the application of sheep wool in the Forest Inspectorate Borki, where this

Table 1. Young forest plantation area not protected with sheep wool and damaged by deer in the Międzychód Forestry Commission

Tabela 1. Powierzchnia upraw leśnych niezabezpieczonych wełną owczą objęta uszkodzeniami wyrządzonymi przez jeleniowate w Nadleśnictwie Międzychód

Year examined Rok badań	Damaged young forest plantation area, ha Wielkość powierzchni upraw leśnych objętych uszkodzeniami, ha			
	total ogółem	including depending on damage extent w tym w zależności od stopnia uszkodzenia		
		up to 20% do 20%	21–50% 21–50%	over 50% powyżej 50%
2008	60.60	55.88	4.72	–
2009	102.68	90.73	11.95	–
2010	244.13	160.69	64.90	19.21
2011	272.71	210.27	59.64	2.80

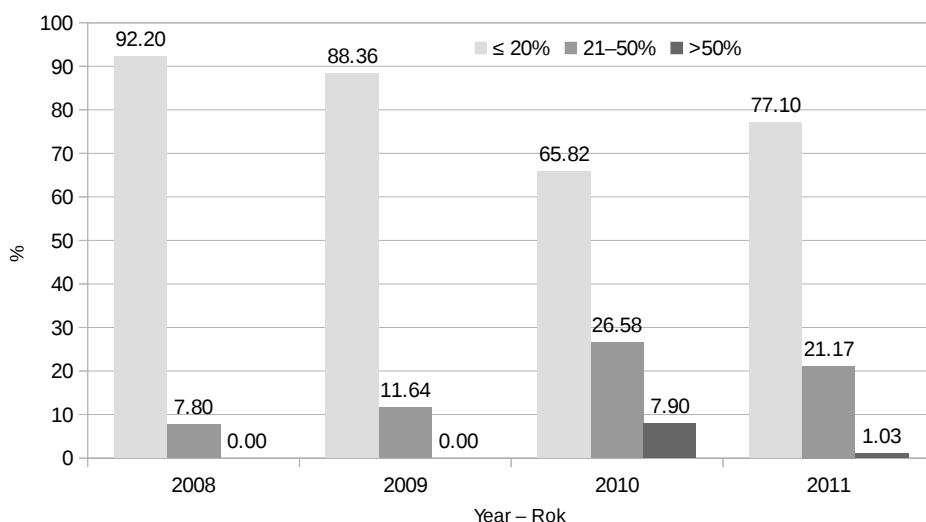


Fig. 1. Percentage of area damaged by deer in young forest plantations which were not protected with sheep wool, depending on damage extent

Rys. 1. Procentowy udział powierzchni objętych uszkodzeniami przez jeleniowate w uprawach leśnych niezabezpieczonych wełną owczą w zależności od stopnia uszkodzeń

environment-friendly method is considered as very effective. They use the wool of Skudde sheep, which has very good properties for this utility. The long wool forms tufts easily, and its strong odor is a very efficient in repelling the deer.

Table 2. Young forest plantation area protected with sheep wool and damaged by deer in the Międzychód Forestry Commission

Tabela 2. Powierzchnia upraw leśnych zabezpieczonych wełną owczą i objętych uszkodzeniami wyrządzonymi przez jeleniowate w Nadleśnictwie Międzychód

Year examined Rok badań	Young forest plantation area protected with wool, ha Powierzchnia upraw leśnych objęta zabezpieczeniem wełną, ha	Area depending on damage extent, ha Powierzchnia w zależności od stopnia uszkodzenia, ha				
		total ogółem		including depending on damage extent, ha w tym w zależności od stopnia uszkodzenia, ha		
		ha	%	up to 20% do 20%	21–50% 21–50%	over 50% powyżej 50%
2008	87.44	2.44	2.79	2.44	–	–
2009	85.93	2.71	3.15	1.94	0.77	–
2010	59.13	29.17	49.33	0.88	5.91	22.28
2011	56.37	6.60	11.71	6.40	0.20	–



Phot. 1. Top shoots of Scots pine protected with sheep wool against deer browsing [photograph courtesy of Międzychód Forestry Commission]

Fot. 1. Pęd wierzchołkowy sosny pospolitej zabezpieczony wełną owczą przed zgryzaniem przez jeleniowate [zdjęcie udostępnione przez Nadleśnictwo Międzychód]

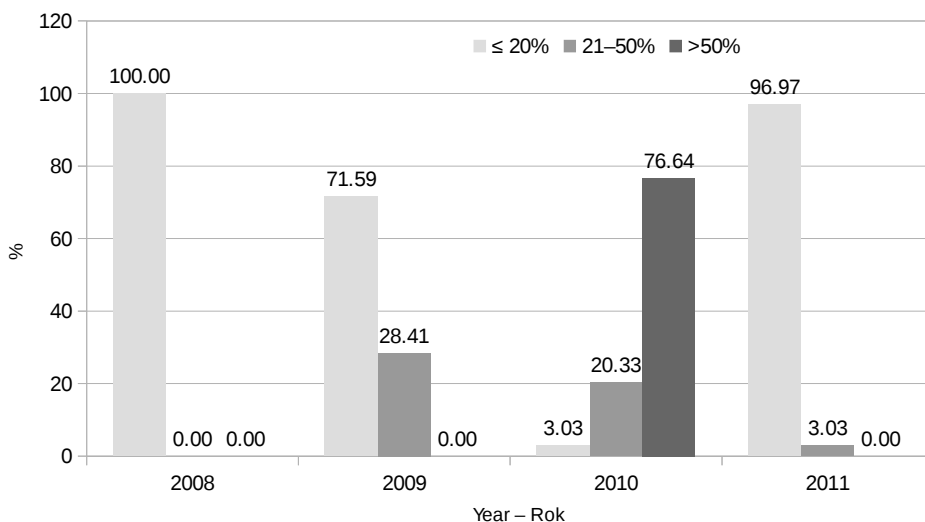


Fig. 2. Percentage of area damaged by deer in young forest plantations which were not protected with sheep wool, depending on damage extent

Rys. 2. Procentowy udział powierzchni objętych uszkodzeniami przez jeleniowate w uprawach leśnych zabezpieczonych wełną owczą w zależności od stopnia uszkodzeń

In Poland, a survey has been carried out on forest plantations that use wool to protect against cervids, but its results remain unavailable, which prevents any discussion. There is, however, an opinion of foresters from Babia Góra that the method is really efficient, which confirms that seeking alternatives to chemical deer repellents is fully justified. This is especially important in places that are protected by law, such as national parks [Hudyka 2011, Bernacka et al. 2013, Bernacka and Siwek 2014].

Borys [2012] also reports on application of sheep wool as a protection measure for young plantations against foraging cervids. The author states that the information on such application of sheep wool comes from an acquainted shepherd, which means that the subject is still poorly represented in literature. Only personal communication may so far provide some knowledge on such use of sheep's wool.

CONCLUSIONS

The results confirm the efficiency of using sheep wool as a preventive measure against damages to forest plantations by cervids. It should be stressed, however, that using a single protection method to prevent deer eating shoots may not suf-

fice during a severe winter, when starving animals may bite off and spit out the protected shoots, and thus being able to reach those unprotected parts.

Both economic and ecological (parks, reserves) aspects speak for using sheep wool on forest plantations and elsewhere, where plants need protection against damages resulting from an activity of both wild or domestic animals.

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WYKORZYSTANIE WEŁNY OWCZEJ W ZAPOBIEGANIU SZKÓD WYRZĄDZANYCH PRZEZ JELENIOWATE W UPRAWACH LEŚNYCH

Streszczenie. W pracy wykazano skuteczność wykorzystania wełny owczej, jako repelentu do ochrony upraw leśnych przed zgryzaniem przez jeleniowate. W analizie brano pod uwagę uprawy leśne zabezpieczone wełną owiec rasy wrzosówka oraz pozostałe uprawy. Stopień uszkodzenia przyjęto zgodnie z dokumentacją uszkodzenia sadzonek: do 20%, od 21 do 50% i powyżej 50% uszkodzonych pędów wierzchołkowych. W uprawach leśnych nie zabezpieczonych wełną owczą powierzchnia objęta uszkodzeniami poczynionymi przez jeleniowate zwiększała się z roku na rok, z 60,6 ha 2008 roku) do 272,71 ha 2011 roku. Uszkodzenia te były zróżnicowane, w zależności od stopnia i ilości uszkodzonych pędów wierzchołkowych sadzonek. Zastosowanie wełny owczej w ochronie upraw leśnych może być alternatywą dla stosowanych w tym celu szkodliwych dla środowiska substancji chemicznych.

Słowa kluczowe: wełna owcza, uprawy leśne, repelent

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