Differences in shrub level food supply of ruminants as determined by the silviculture method

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Abstract - According the new law for forestry implemented in 2009 new forest management policy was introduced. Increasing ratio of forests have to be treated by continuous forest cover method instead of traditional cut methods. We investigated the biomass available for ungulates in beech forests by strip sample method. We counted the twigs of tree and shrub species and taking into account the mean diameter of the browsed twigs, calculated the biomass. We stated that even after some years after change to countinuous forest cover management the food supply avilable for ruminants was increased.

Keywords: ungulates/ continuous forest cover method / biomass/ common beech

1. Introduction

Earlier studies (MATRAI AND KABAI, 1989; SZEMETHY ET AL., 2001) prove that local herbivorous large game species primarily utilize food sources located at shrub level; although, they also consume significant amounts of grasses as well (NAHLIK, 1989; SZEMETHY ET AL., 2000; MATRAI ET AL., 2002). Forests managed by clear cutting practices often have limited or completely lack adequate shrubby vegetation (BARTHA, 1996). Due to cleaning procedure by removing the young shrubs and trees, almost a 100% of the remaining shrub vegetation is made up of seedlings of target species; therefore, large game can only feed from these species of vegetation, thus causing the greatest damage to these seedling species (NAHLIK, 1996). A larger proportion of a more varied vegetation profile offers greater selection of shrub and tree seedling species; therefore, deer and roe deer are distracted from seedlings of the beech (NAHLIK AND TARI, 2006). In this study we conducted a comparative examination in order to determine whether old growth woodlots of beech (as preferred tree species) show any differences in biomass and composition of shrub and tree species compared to woodlots managed by individual and group selective cut and strip clear cut.

2. Materials and Methods

For our examination we selected woodlot segments in beech forests, where vegetation status reflected original nudum prior to any type of cutting, status where strip clear cutting was practiced, status where group selection and status where individual selection was done. Samples were taken from specified 3m wide strips while taking into consideration the various cutting techniques and size of the study sites. In each sample strip we counted and identified every stem of woody vegetation suitable as a food source for wild game. We considered all shoots suitable as food source located up to 2.2m from ground level and located on branches above the last split (KATONA ET AL., 2007).

Based on the results of earlier studies (NAHLIK, 1989) we collected shoots of each tree species, then after a laboratory analysis we determined the average shoot-mass of the samples. Based on the field and laboratory data we determined the biomass of each sampled tree species as well as a total value, which we then further extrapolated for the entire woodlot community and quantified it in kg/ha.

We used the *Past* software to statistically analyze our data, we did our X^2-test with the Mann-Whitney U-test.

3. Results

3.1. Results of shoot-mass determination

For the mass determination of shoot samples collected at the field and analyzed in the laboratory we determined the average shoot-mass in grams (*g*) to two tenth accuracy (microgram), (Table 1).

	Mass (g)	Diameter (mm)
Common Beech (*Fagus sylvatica*)	0.33	2.1
Sessile Oak (*Quercus petraea*)	0.36	3.2
Common Hornbean (*Carpinus betulus*)	0.46	2.5
Sycamore Maple (*Acer pseudoplatanus*)	0.45	3.4
Hedge Maple (*Acer campestre*)	0.64	3
Common Ash (*Fraxinus excelsior*)	0.38	2.6
Black Elder (*Sambucus nigra*)	0.56	5.8
Rubus (*Rubus fruticosus*)	1.76	1.9

1. Table: Average shoot-diameter and accompanying shoot-mass of vegetation chewed by wild game (after: NAHLIK, 1989).

From our examination it was determined that the dry mass of wild blackberry shoots was the greatest, followed by the field maple and the blue elderberry. Earlier food source studies also found these species to be preferentially represented in the food consumption of wild game.

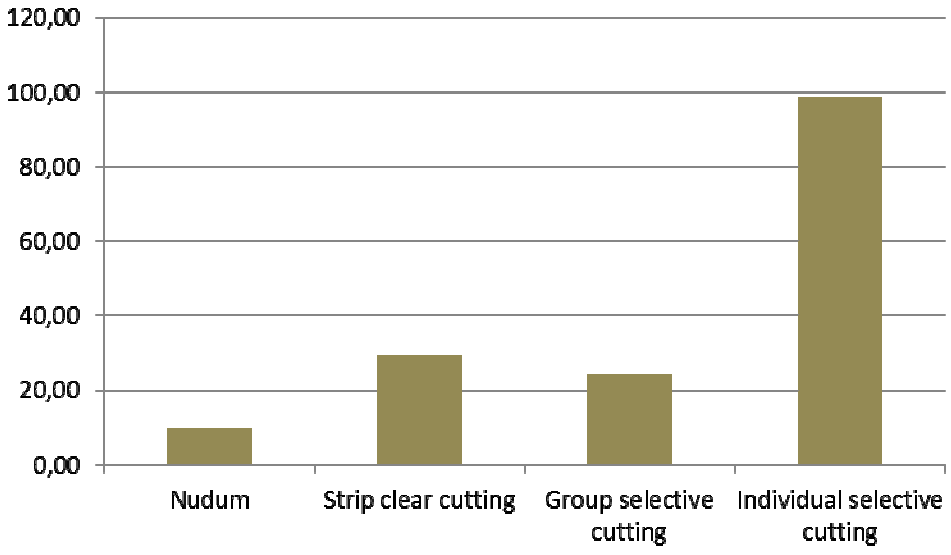
3.2. Determined biomass results

In the nudum woodlots and in woodlots managed by strip clear cutting the biomass was largely represented by beech; whereas the presence of other plant species was insignificant (table 2).

	Nudum	Strip clear cutting	Group selective cutting	Individual selective cutting
Common Beech	9.42	25.74	0.44	20.38
Sessile Oak	0.00	0.00	0.00	0.00
Common Hornbean	0.00	0.46	0.19	2.38
Sycamore Maple	0.17	2.45	0.49	4.49
Hedge Maple	0.00	0.41	0.00	0.03
Common Ash	0.00	0.00	0.25	0.48
Black Elder	0.00	0.30	0.00	0.05
Rubus	0.00	0.02	22.87	70.93

Table 2: Amount of biomass per plant species available for feeding by wild game in beech forests managed by various cutting techniques (kg/ha).

In woodlots managed by group selective cutting or individual selective cutting biomass of wild blackberry was the greatest; closely followed by beech in individual selective cut woodlots. In terms of identified species, biomass of the Sycamore Maple was most significant in both seelctive cut woodlots. In terms of total available biomass for feeding of wild game the lowest value was measured in unmanaged nudum beech forests (figure 1).



1. Figure: Total available biomass for feeding of wild game in different beech forests depending on applied management techniques.

In forests managed by strip clear cutting and group selective cutting the measured biomasses were greater, twice as high, compared to nudum state woodlots; whereas, in the case of individual selective cut woodlots the measured value was over ten times greater than that of the nudum state value. In terms of biomass of identified plant species, each species showed significant ($p \leq 0.01$) differences between measurements of the unmanaged nudum state woodlots and all other managed forests.

4. Summary

In this study we conducted a comparative examination in order to determine whether old growth woodlots show any differences in biomass and composition of shrub and tree species compared to woodlots managed by selective cutting and strip clear cutting techniques.

For our examination we selected woodlot segments in beech forests, where vegetation status reflected original nudum prior to any type of cutting, status where strip clear cutting was practiced, status where group selective cutting took place and status where individual selective cutting was done. Based on the field and laboratory data we determined the biomass of each sampled tree species as well as a total value, which we then further extrapolated for the entire woodlot community and quantified it in kg/ha.

In nudum forests biomass was mostly composed of beech while other species were barely represented; in woodlots managed by selective cutting the biomass was most significantly composed of rubus. In terms of biomass of identified plant species, each species showed significant differences between measurements of the unmanaged nudum state woodlots.

Compared to the nudum state forests, examined by our study, selective cutting management techniques of beech forests positively influenced understory vegetation in terms of available biomass and species composition soon after beginning of active management. This is clearly advantageous to wild game and forest managers alike.

It is important to expand this study in the future and examine all cutting management techniques further in order to scientifically validate their impact and effectiveness as well as to have reliable data for comparative examination of various management practices. Based on our current understanding it appears that biomass available to wild game for consumption shows a rapid increase at the early stages, which is first followed by an increase in plant species diversity (number of species), then followed by an increase of biomass per each newly appeared plant species. In order to effectively validate our results and its implications for the long term, future monitoring research is needed to validate our observations at depth which

can help identify and scientifically evaluate the effects of selective cutting management techniques on wild game.

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