Ph.D. Thesis

THE FOOD SELECTION OF ROE DEER (CAPREOLUS CAPREOLUS) ON PLAIN HABITATS

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I. THE BACKGROUND OF THE RESEARCH AND ITS OBJECTIVES

In Europe and in our homeland the roe deer is the most widespread big game. It can be found from the Mediterranean countries almost up to the polar circle, in the forests as well as on intensively cultivated agricultural areas as well. The density of the population varies according to the geographical conditions and the hunting intensity on the given area.

The size and the quality of the domestic roe deer population deserve attention from the hunting and economic point of view. On considerable part of the country's hunting grounds – primarily on the Great Hungarian Plain – roe deer is the only big game which can be found in considerable numbers and as a trophy game is available for most Hungarian and foreign hunters (**CSÁNYI and SZIDNAI**, 1993).

The gallery forests, the wooden steppe and the scrublands are considered to be the ancient habitat for roe deer. It also can be found in coniferous forests, forest edges and on the bordering lawn as well as in cultivated agricultural areas. It is found also in smaller numbers on large treeless lands as well. The relatively undisturbed large scale farm areas led to the increasing population of roe deer on the Great Plain. The improvement of the habitat with afforestation and the forming of forest belts and patches also helped the positive population. The roe deer adapted to the agricultural environment as well. So that nowadays has been discerned the field and the forest roe deer ecotypes. The two ecotypes are different in their behavior, social contacts and feeding habits (**CSÁNYI**, 1989; 1992). The big board farming which came into existence next to the forest belts and patches provide enough peace and feed for the roe deer (**BAKKAY et al.**, 1978).

The roe (*Capreolus capreolus*) is the big game which is generally found in the largest number to Hungary; the estimated population in 2010 exceeded three hundred and fifty thousand. The food selection habit of one of the most important big games in our homeland has not been researched yet detail made in the counties Csongrád, Békés and Bács-Kiskun, where the roe deer population is numerous and excellent. The detailed knowledges of the related specific feeding strategies contributes not only to the better cognition of this kind but also provides a developed opportunity for the game managers to reach better game husbandry results.

The aim of my research is to find out what kind of differences and resemblances can be found in feeding strategies at the examined plain habitats.

The plant species combination of the feed ratio consumed was determined by the vegetation found on the monitored territory. The quality of the feed is the most important factor which enables to influence the density of the population, the body- and trophy weight and the reproduction performance altogether and respectively (**CSÁNYI,** 1994; **GAILLARD et al.,** 1998).

Beyond the practical significance of the theme there are some other peculiarities to be cleared up in connection with the nourishment of roe deer. The practical and theoretical questions are what kind of feeding strategies would be typical and reasonable for the roe deer living on the plain at different seasons?

1.1. The most important questions about the food selection of roe

The roe is known as "concentrate selector" which can be proved by the amount of plant species consumed at different periods of the year. Although roe deer is the most researched game in Europe and Hungary we have little information about its food preferences on plain habitat.

I have considered the proceeding and evaluation of home and foreign literatures concerned and I also intend to summarize the major questions which need to be cleared accordingly:

- How does the food choice of roe deer vary in the different periods of the hunting season, particularly in fall and winter when there is less food and in spring and summer when the feed can be found in abundance and also in different hunting seasons?
- In the hunting season of the doe (1.October –28.February) it is especially important to know the feeding habit of roe deer, how does the feed selection prevail. What kind of food is consumed according its physiological demands?
- The next question which should be answered – according to the hunting season of the roebuck – how does the proportion of the main feed components change at different growing seasons on different plain habitats?
- Do the main food components vary on plain habitats with different ecological conditions and in different seasons respectively?
- Furthermore the basic food preferences of roe deer are less known, how the wanted or avoided plant species have been offered by the habitat and cultivated plants?

1.2. Starting from the objectives of the research I set the following hypothetical questions to be answered

a) How do food preferences of the roe deer population on the examined territories differ in the hunting seasons of doe and roebuck according to the ecological conditions, agricultural cultivation and the rate of afforestation?

b) Are identical food preferences of the roe deer population in the examined period on the same habitats but in different years, in the hunting seasons of doe and roebuck according to the ecological conditions, agricultural cultivation and the rate of afforestation?

c) The role of woody plants in the diet of the roe is less known. Would be important the consumption of woody plants – according to domestic researches and results – throughout the year?

d) How should be considered the conditions of the examined areas; and the vegetation found on them can influence the food preferences of roe deer? Are the food preferences of roe deer identical on different plain habitats in the examined years, or not?

II. THE METHODS OF THE RESEARCH

2.1. The material of the research (database)

My examinations were made at the hunting seasons between 2006 and 2009. For creating the database I have collected samples and registered data from the dropped game and in the hunting season of the doe (1. October–28. February) and of the roebuck (15. April–30. September). Altogether I have examined 436 roe deers (211 does and 225 roebucks) and registered their data. For choosing the sample areas the main aspect was to find hunting territories on the Great Hungarian Plain which has different types of habitat, where the quality of roe population ranked differently but they are not too far from each other. Besides it was very important for me that the professional hunters that helped me during collecting the samples should be reliable. As they have earlier by gained experience in such examinations they could help my work in accordance with the professional and scientific requirements. The sampling for all these years from four hunting territories demanded continuous efforts and organization. It is my pleasure to express my gratitude for the generous and continuous support for the professional staff accomplishing the basic research task.

2.2. Introduction of the roe deer population on the examined habitat

For the introduction of the examined territories I have used the data found in the National Game Management Database (OVA). The short introduction consists of a short ecological description which shows the differences between the areas and I would like to introduce the roe deer stock found on the given territory.

2.2.1. Alpári Tisza Shoot, Tiszaalpár

Site: 6066 Tiszaalpár, Csongrádi úti körzet 14

Code number: 03-603810-1-4-1

Rank: I/6- small game district between the rivers of Danube and Tisza, and over the Tisza

Total Area: 10,173 hectare

Introduction of the roe deer population of Tiszaalpár

According to the trophy evaluation data the quality is “good” the importance is “high”.

Number and cover data can be found in Figure 1.

Figure 1.

The main data of the roe deer population of the Alpári Tisza Shoot of Tiszaalpár

	ESTIMATED NUMBER (PCS)				COVER (PCS)			
	Buck	Doe	Kid	Total	Buck	Doe	Kid	Total
2006	60	80	60	200	17	15	28	60
2007	60	80	60	200	18	15	28	61
2008	85	117	98	300	16	21	25	62
2009	85	120	140	345	25	21	35	81

Resource: National Game Management Database (2006-2009)

2.2.2. Csongrádi Bársony István Shoot, Csongrád

Site: 6640 Csongrád, Szentesi út 2/a

Code number: 06-800310-3-4-1

Rank: I/4 - small game district between the rivers of Danube and Tisza, and over the Tisza

Total area: 3,010 hectare

Introduction of the roe deer population of Csongrád

According to the trophy evaluation data the quality is "good" the importance is "high".

Number and cover data can be found in Figure 2.

Figure 2.

The main data of the roe deer population of the Bársony István Shoot of Csongrád

	ESTIMATED NUMBER (PCS)				COVER (PCS)			
	Buck	Doe	Kid	Total	Buck	Doe	Kid	Total
2006	25	40	35	100	8	14	8	30
2007	28	42	37	107	9	16	12	37
2008	30	44	37	111	12	15	9	36
2009	35	47	34	116	15	18	10	43

Resource: National Game Management Database (2006-2009)

2.2.3. Petőfi Shoot, Nagyszénás

Site: 5931 Nagyszénás, Orosházi út 478/1

Code number: 04-953620-1-4-1

Rank: I/7- small game district between the rivers of Danube and Tisza, and over the Tisza

Total area: 7,096 hectare

Introduction of the roe deer population of Nagyszénás

According to the trophy evaluation data the quality is "excellent" the importance is "high". Number and cover data can be found in Figure 3.

Figure 3.

The main data of the roe deer population of the Petőfi Shoot of Nagyszénás

	ESTIMATED NUMBER (PCS)				COVER (PCS)			
	Buck	Doe	Kid	Total	Buck	Doe	Kid	Total
2006	120	160	85	365	22	21	20	63
2007	130	160	90	380	24	16	15	55
2008	130	170	100	400	22	25	18	65
2009	140	170	110	420	25	20	16	61

Resource: National Game Management Database (2006-2009).

2.2.4. Trade Union Shoot, Hódmezővásárhely

Site: 6800 Hódmezővásárhely, Táncsics u. 25

Code number: 06-803310-1-4-1

Rank: I/4- small game district between the rivers of Danube and Tisza, and over the Tisza

Total area: 12,727 hectare

Introduction of the roe deer population of Hódmezővásárhely

According to the trophy evaluation data the quality is "good" the importance is "high". Number and cover data can be found in Figure 4.

Figure 4.

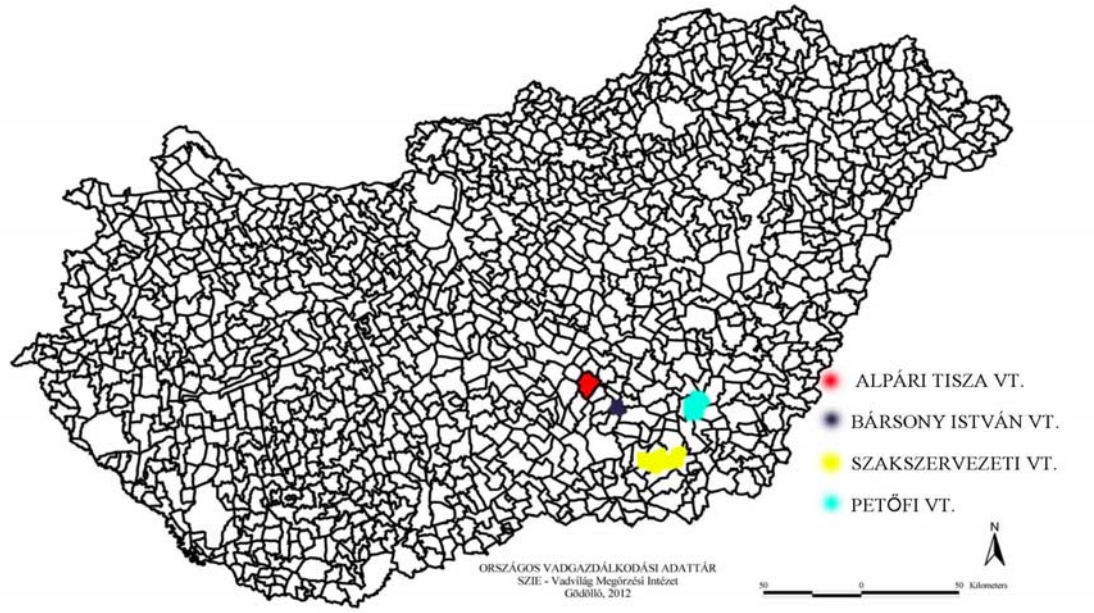
The main data of the roe deer population of the Traid Union Shoot of Hódmezővásárhely

	ESTIMATED NUMBER (PCS)				COVER (PCS)			
	Buck	Doe	Kid	Total	Buck	Doe	Kid	Total
2006	130	160	90	380	45	25	35	105
2007	140	170	100	410	46	22	35	103
2008	140	170	140	450	47	30	30	107
2009	170	180	150	500	50	30	30	110

Resource: National Game Management Database (2006-2009)

2.3. The location of the examined shoots and the summary of the characteristics of their roe deer population

Picture 1. : The geographical location of the examined shoots



Source: National Game Management Database (2012)

Figure 5.

Summary of the characteristics of the roe deer population on the examined shoots

	ALPÁRI TISZA VT.	BÁRSONY I. VT. CSONGRÁD	PETŐFI VT. NAGYSZÉNÁS	SZAKSZERVEZETI VT. HÓDMEZŐVÁSÁRHELY
Code number of the territory	**03-603810**	**06-800310**	**04-953620**	**06-803310**
Rank of the territory	**I/6**	**I/4**	**I/4**	**I/4**
Total area (ha)	**10.173**	**3.010**	**7.096**	**12.727**
Quality of the roe deer population	**good**	**good**	**excellent**	**good**
Importance of the roe deer population	**high**	**high**	**high**	**high**
Estimated size of the population (pcs.)	**345**	**116**	**420**	**500**
Annual drop (pcs.)	**81**	**43**	**61**	**110**
Utilization in %	**23,47**	**37,06**	**14,52**	**22**
Density of the population (pcs./100 ha)	**3,75**	**4,14**	**6,46**	**4,46**

2.4 The method of collecting the required materials

The means and materials used for the collection of specimen were provided by my workplace, the University of Szeged Faculty of Agriculture Institute of Animal Husbandry and Game Management. To be sure that the sample taking is accurate for the possibilities of the professional evaluation I managed the sampling on the same time and way every year on the concerned territories. The helpers and the professional hunters had been taken part on

training how to collect and store the samples. For the precise record keeping we have entered all the data, exact time and place of the drop, into the „Sample Notebook". After the evisceration approximately 150-200 grams of feces were removed from the rectum that was packed separately into labeled small plastic bags, closed properly and placed into the freezer where they were kept between 8–12 °C until processing.

2.5. The size up of the vegetation on the examined habitats

I estimated the composition of the vegetation by the overlay (%) by placing on every 4-500 hectares in south-north direction transects 4-5 pcs $10m^2$ sample areas on every hunting territory on the feeding level of roe deer (up to 120 cm height) according to the works of **MÁTRAI el al.** (2002). The places of the drop were recorded by the ARCGIS ARCMAP 9.3.1 type software which was developed by the company ESRI. The used map data was provided by the Digital Map Database (version code: DTA-50 2.2.10).

To show the relation between the specific plant species found on the habitat and in the feed of roe I calculated a **PREFERENCE-INDEX** (PI) (**IVLEV**, 1961).

$$\mathbf{PI = (N_2 - N_1) / (N_2 + N_1)}$$

Where: **PI = IVLEV's preference index**, its value ranges from -1up to +1

N_1: the percentile consumption of the specific plants

N_2: the percentile supply of the specific plants

I have defined the vegetation supply on all four hunting territories every month in such a way that while entering the data I have registered the changes in the habitat (harvest, reaping, etc) This kind of sampling showed me the supply of the plant species (%) on every territory in a monthly breakdown.

To determine the rate of food compound and the possible differences of roe dropped on the same area but in different years or rather in the same period (year and month) but on different territories I have used **PEARSON'S CHI^2**-test.

2.6. Laboratory examinations

The micro histological examinations of the doe and roebuck were made in the laboratory of the University of Szeged. I recorded all the data and measurements in the

"Laboratory Notebook". The determination of the consumed food with the micro histological method was the following:

I used the micro histological method developed by the following authors: **STEWART**, (1967); **FITZGERALD and WADDINGTON**, (1979); **DAVITT – NELSON**, (1980); **MÁTRAI et al.**, (1986); **BURUCS et al.**, (1986); **ALIPAYO et al**., (1992).

For the micro histological analysis I put the gathered sample into Petri dishes, after it melted I added some drops of the physiological water to be homogenized. From the homogenized sample I took out subsamples, two from each sample and put 3-4 ml-s into the test tubes. After that I have fractured the plant parts with nitric acid of 20% for 90 seconds. I put the loosened epidermis onto a slide where I resolved it with 1-2 drops of 87% glycerol and with 1 drop of 0,2% toluidin-blue tincture, according to the directions of **MÁTRAI and KATONA** (2004). In order to identify the plant components faster and more accurately I used the "**Micro histological adverbial key for the food examination of herbivores**" program. The analysis of the food compound is made by enlarging the samples in 160-200 times with a **Ceti** made **Steddy-T** type stereo microscope.

For the identification of the food components during the growing season I have put together a photo collection of the photographed epidermis tissues. The epidermis is one of the most resistant plant tissues which physical structure did not change during digestion.

2.7. Grouping the main food components

According to the works of **DUNCAN et al.** (1998), **BARANCEKOVÁ** (2004), and **MÁTRAI et al.** (2010) I made the following classification of the main food components:

1. Monocotyledonous plants

The plants in this group are preferred food sources on all the habitats I have examined, for example: sedges (*Carex spp*.), the Bermuda grass (*Cynodon dactylon*), the quack grass (*Agropyron repens*) and the meadow fescue (*Festuca pratensis*).

2. Dicotyledonous plants

In this group are the naturally grown dicotyledonous plants like the narrow leaf vetch (*Vicia sativa L.*), the hairy vetch (*Vicia villosa Roth*.), the Hungarian vetch (*Vicia pannonica*) are the most important ones. In this group are the spotted ladysthumb (*Persicaria maculosa*), the white campion (*Silene latifolia subsp. alba*), the black horehound (*Ballota nigra*), the

spiked speedwell (*Veronica spicata*), the common buglos (*Anchusa officinalis*), the white goosefoot (*Chenopodium album*) and the orange mullein (*Verbascum phlomoides*).

3. Woody plants and their sprouts

The young sprouts of woody trees are important food sources on all the examined territories. Extremely important are black elderberry (*Sambucus nigra*), the black locust (*Robinia pseudoacacia*), the dewberry (*Rubus caesius*). Also prefered are the sprouts and the crop of silver berry (*Elaeagnus angustifolia*), the privet hedge (*Ligustrum ovalifolium*), the common hackberry (*Celtis occidentalis*), the field maple (*Acer campestre*), the manna ash (*Fraxinus ornus*) the English oak (*Quercus robur*) and the sessile oak (*Quercus petraea*).

4. Monocotyledonous cultivated plants and their crop

I have examined this group separately because it is a common food source which needs more attention. In this group we can find the green parts and the crops of cultivated plants like bread wheat (*Triticum aestivum*), the common barley (*Hordeum vulgare*), the cultivated rye (*Secale cereale*), the triticale (*Triticale*) and the maize (*Zea mays*).

5. Dicotyledonous cultivated plants

The most important plants in this group are the fabaceae, like the alfalfa (*Medicago sativa*), the clover (*Trifolium spp*.), the black hay (*Medicago lupulina*), the rapeseed (*Brassica napus*) and the sunflower (*Helianthus annuus*).

2.7. The method of statistical data processing

The statistical data was processed by the statistics programs: SPSS for Windows (14.0 Standard Version), PASW 18.0 and by Excel.

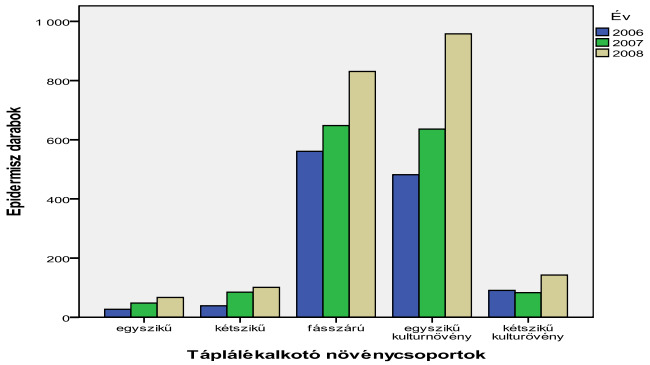
I have used the following method for the data evaluation:

- I have made **DESCRIPTIVE STATISTICS** of the main food compounds for doe and roebuck on all examined territories for every year.
- For examining the differences in the seasonal food compound I have used **PEARSON'S CHI^2-PROBE (χ^2)**.
- For the definition of the food preferences of roe on different habitats in two calendar years the **IVLEV-INDEXET** (PI) was used. The significancy test was made with the help of **BONFERRONI'S Z-TEST** (**BYERS et al**., 1984).

III. THE MAIN OBSERVATIONS IN THE PAPER

1. After examining the food compounds of the doe on the sample territories we can state that the rate of food components in the examined years on the tiszaalpári shoot, where the woodland is more than 30%, was significantly different from the other territories However the rate of consumed monocotyledonous plants (2.25–3.20%) and dicotyledonous plants (3.24–5.71%) was almost the same. Examining the woody plants I received a high value (39.55–46.74%), but it is lower then the value by **MÁTRAI et al.** (1986) which was collected in the Gödöllő hills (92.16%). In Tiszaalpár the following wooden plants were preferred: black locust *(Robinia pseudoacacia)*, the elderberry *(Sambucus nigra)* and the common blackberry *(Rubus fruticosus)*. (Figure 2)

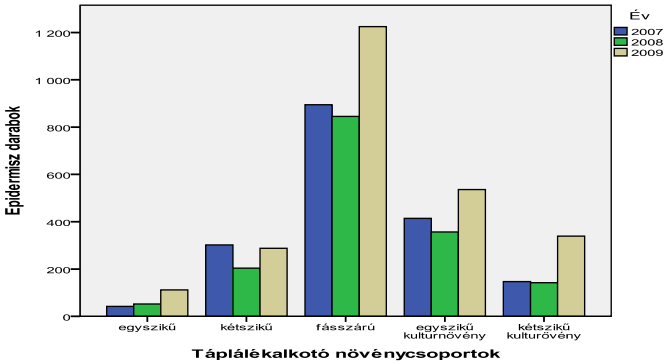
Figure 2.: Food compound of the doe dropped at Tiszaalpár (n=48)



The doe dropped in Tiszaalpár liked monocotyledonous plants because in the samples a big amount (40.15–45.64%) was found of autumn cereals which are very important for the roe deer in fall and winter The consumption of dicotyledonous plants was 5.53–7.62% the most frequently eaten plants in this group were the alfalfa and the rape.

2. After examining the food compound of roebucks we can see that the rate of the monocotyledons was between 2.32–4.47% primarily the couch grass (*Agropyron repens*), the Bermuda grass (*Cynodon dactylon*) and different sedges (*Carex spp*.) were eaten. In the case of dicotyledonous plants the rate was (11.52–16.76%) mostly the common bugloss (*Anchusa officinalis*), the hairy vetch (*Vicia villosa*), the black horehound (*Ballota nigra*), the goosefoot (*Chenopodium album*), the orange mullein (*Verbascum phlomoides*), the hawkweed oxtongue (*Picris hieracioides*) and the common gypsy weed (*Veronica officinalis*) were the most preferred plants.

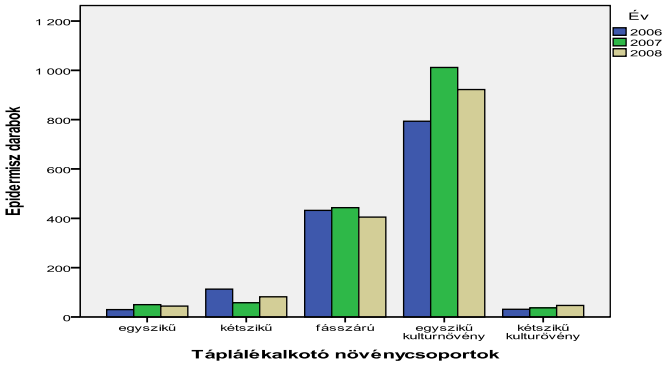
Figure 3.: The food compound of the roebuck dropped in Tiszaalpár (n=59)



The consumption of woody plants was dominant from spring to fall (48.99–52.80%), there was no significant difference between the years especially the presence of the black locust *(Robinia pseudoacacia)* and the black elder *(Sambucus nigra)* was dominant. The roebuck dropped in Tiszaalpár liked the monocotyledonous plants as well (winter wheat, barley and rye) as I have found these plants in large amount (21.44–23.04%) in the samples in the spring period. The importance of dicotyledonous cultivated plants was between 8.18–13.58% mostly the following cultivated plants were consumed: alfalfa, white clover and rape.

3. In the case of doe dropped in Csongrád we can state that the rate of the food compound varied in the examined years. The consumption of monocotyledonous plants was almost the same every year (2.14–3.15%). The rate of dicotyledonous plants was between 3.63–8.05% in the examined years. The consumption of woody plants was high every year (26.97–30.90%), in these periods the crops of the locust, the elder, the dewberry, the maple, the pine and the ash was representative (Figure 4).

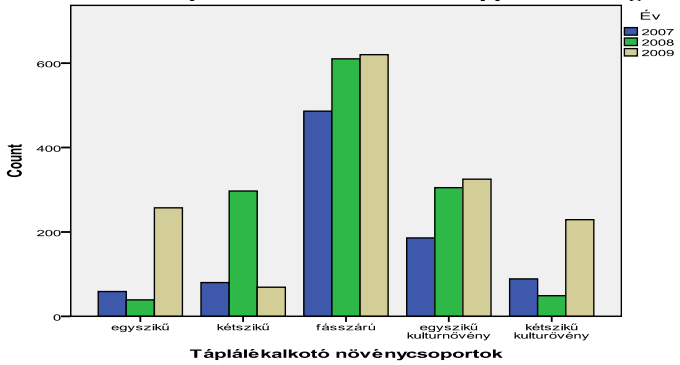
Figure 4: The food compound of the doe dropped in Csongrád (n=45)



The doe examined in Csongrád preferred the monocotyledonous cultivated plants as I found them in large quantities in the samples (56.70–63.24%) every year, the sown in autumn cereals are very important feed in the autumn-winter period for the roe deer. The consumption of dicotyledonous plants was between 2.21–3.15%. The rape and the alfalfa were eaten most frequently on this territory (Figure 4).

4. Examining the food compound of the roebuck in Csongrád we can see that the rate of monocotyledonous plants was between 3.27–17.12% most frequently eaten were the meadow fescue (*Festuca pratensis*), the couch grass (*Agropyron repens*), the Bermuda grass (*Cynodon dactylon*) and different sedges (*Carex spp.)*. In case of dicotyledonous plants I measured a larger rate (4.60–24.75%) mostly by the common bugloss (*Anchusa officinalis*), the hairy vetch (*Vicia villosa*), the goosefoot (*Chenopodium album*), the orange mullein (*Verbascum phlomoides*), the awkweed oxtongue (*Picris hieracioides*), the common gypsy weed (*Veronica officinalis*) and the black horehound (*Ballota nigra*) were consumed in most cases on this territory (Figure 5).

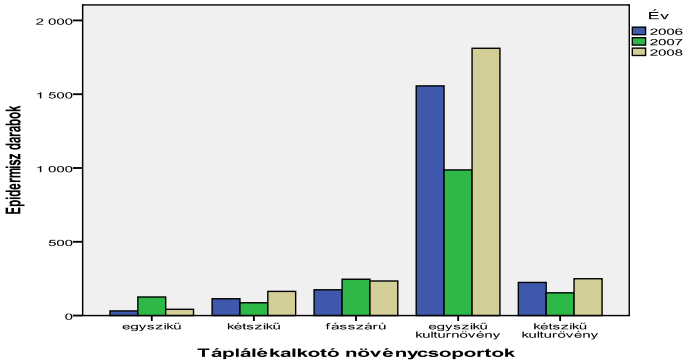
Figure 5.: The food compound of the roebuck dropped in Csongrád (n=36)



The consumption of woody plants was significant from spring to fall (41.36–54.05%), there was no big difference regarding the years, mostly the locust, the elder were dominant. The roebucks examined in Csongrád liked the monocotyledonous plants also (winter wheat, barley rye and oat) because I have found these plants in large quantities 17.07–21.67% in the samples. The importance of the dicotyledonous plants was between 4.03–15.28% mostly the consumption of cultivated plants was typical like alfalfa, the clover and in early spring the rape.

5. After examining the doe of Nagyszénás I could conclude that the rate of monocotyledonous plants in the food compound is low 1.48–7.88%, the rate was higher in the case of dicotyledonous plants 5.43–6.56%. The consumption of woody plants was high in 2006 and 2008 (8.29–9.36%) although the wooded part of the territory is very small (less than 1%). In 2007 the presence of woody plants in the feed was extremely high, (15.38%). In all three examined years the rate of consumed by the doe monocotyledonous plants was 61.69-74.14%. The importance of monocotyledonous plants (9.00-10.19%) was similar to the importance of the woody plants (Figure 6).

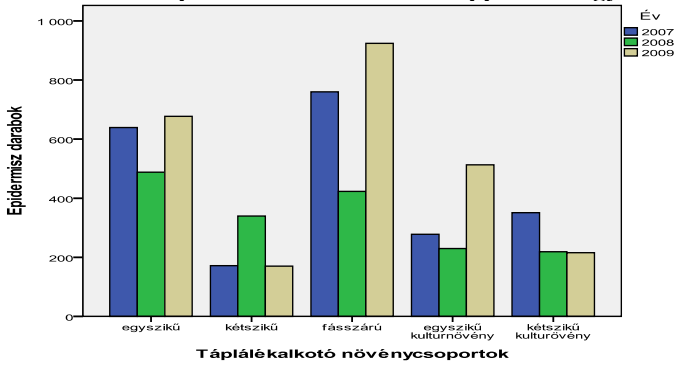
Figure 5.: The food compound of the doe dropped in Nagyszénás (n=62)



The doe examined in Nagyszénás mostly consumed monocotyledonous plants, their rate was 61.69–74.14% in every year. The importance of dicotyledonous plants was almost the same (9.00–10.19%), as of the woody plants. In the researches of **MÁTRAI** (2000; 2006) I could see that the dominant food components on field habitats were the parsley, the turnip top, the winter wheat and the barley. She believes that roe deer did not find it difficult at all to feed on the weeds bordering the fields, as they were easily digestible broad leaved plants that are green in winter time as well. However it was not typical in Nagyszénás. Their main food was composed by the plants found near to the place where they were dropped. **MÁTRAI** (2006) says that roe deer have to save energy in winter because their digestion is more intense because of their smaller size than the digestion of the deer. According to **FARAGÓ** (1993) in winter corn was the most important food source that is why almost 50% of roe deer choose this type of habitat.

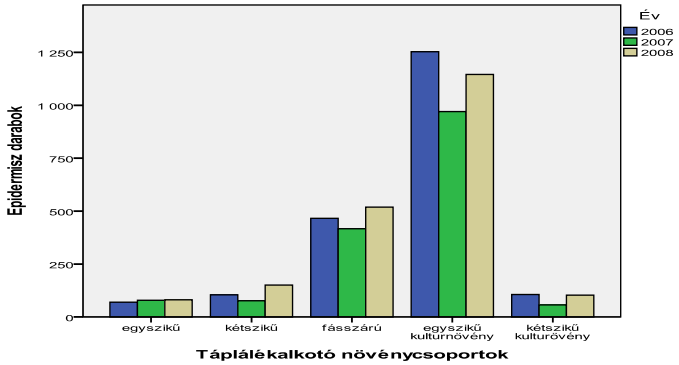
6. Examining the roebuck of Nagyszénás we can see that the monocotyledonous plants are the main food sources. Their presence in the food compound in 2007 was 29.06%, in 2008 was 28.69%, and in 2009 was 27.08% which was a little different from the earlier results of **MÁTRAI** (2000). Analyzing the dicotyledonous plants I have found a smaller rate (6.80 and 19.98%). Mostly the common bugloss (*Anchusa officinalis*), the hairy vetch (*Vicia villosa*), the black horehound (*Ballota nigra*), the goosefoot (*Chenopodium album*), the orange mullein (*Verbascum phlomoides*), the Hawkweed Oxtongue (*Picris hieracioides*) and the common gypsyweed (*Veronica officinalis)* were consumed. The consumption of woody plants was very significant in this period (24.86–36.96%), there was no difference between the years. In most cases the locust, the elder, the privet and the sugarberry were eaten. The roe in Nagyszénás liked the monocotyledonous cultivated plants as well, as their rate is considerably high (12.63–20.52%) in the samples I have found winter wheat and barley. The importance of the dicotyledonous plants, the rape, the hop and the alfalfa (8.64–15.94%) cannot be neglected on this territory (Figure 7).

Figure 7.: The food compound of the roebuck dropped in Nagyszénás (n=64)



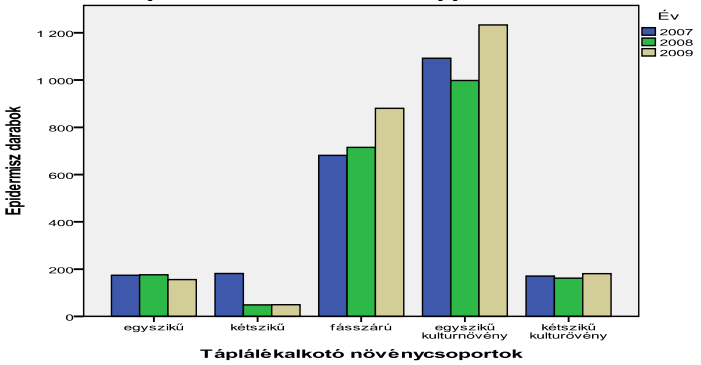
7. Examining the main food compounds in Hódmezővásárhely we can see that the doe consumed only little of the monocotyledonous plants 3.50–4.97% the rate of dicotyledonous plants was a bit higher (4.80–7.55%). The consumption of woody plants was high – like in Nagyszénás – although the forested areas are small (23.30–26.05%). The doe dropped in Hódmezővásárhely preferred the monocotyledonous cultivated plants (57.30–62.65%). The importance of the dicotyledonous plants is almost the same (3.55–5.30%) as the importance of monocotyledonous plants (Figure 8).

Figure 8.: The food compound of the doe dropped in Hódmezővásárhely (n=56)



8. After examining the food compound of the roebuck in Hódmezővásárhely I found that the monocotyledonous plants are less dominant than it was in Nagyszénás which has almost the same parameters. Their rate was between 6.24–8.38% In the case of dicotyledonous plants I have found the same, only the rate was smaller (2.00–7.91%). The consumption of woody plants in this period was very common (29.61–35.20%), I could not discover big differences between the examined years. The roebuck in Hódmezővásárhely liked monocotyledonous cultivated plants as well as I could find them in the samples in big quantities (47.48–49.32%), the importance of the dicotyledonous plants was between 7.24–7.71%. (Figure 9).

Figure 9.: The food compound of the roebuck dropped in Hódmezővásárhely (n=66)



9. During the annual evaluation of the studied food components on all the sample areas it can be stated that the food selection and the proportion of food components of doe and roebuck in Tiszaalpár, Csongrád, Nagyszénás and Hódmezővásárhely was very diverse in every shooting period. Examining the fall-winter food component of doe on the sample areas we can say that the rate of different food components in the studied years varied significantly ($p<0.05$) only on Nagyszénás habitat (Figure 6.). The consumption of woody plants was high in every year (8.29–46.74%) regardless to the forest cover. On the territories I have examined the consumption of woody plants was lower than in **MÁTRAI et al.** (1986), and **MÁTRAI and KABAI** (1989) on the Gödöllő hills, where roe deer consumption of woody plants in 70-100% consisted of several species (1-3 pcs).

Figure 6.

Annual comparison of the food components of doe on the examined territories*

	Tiszaalpár		Csongrád		Nagyszénás		Hódmezővásárhely	
	2007	**2008**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**
2006	χ^2=3,3 p=0,507	χ^2=3,4 p=0,487	χ^2=6,7 p=0,150	χ^2=2,8 p=0,590	χ^2=10,5 p=0,032	χ^2=0,6 p=0,960	χ^2=1,2 p=0,872	χ^2=1,7 p=0,778
2007	-	χ^2=0,9 p=0,913	-	χ^2=0,9 p=0,925	-	χ^2=28,3 p=0,000	-	χ^2=1,5 p=0,817

*: df=4, in all tests.

In case of the roebuck the rate of food components in the examined years did not differ significantly only on the Tiszaalpár habitat (Figure 7).

Figure 7.

Annual comparison of the food components of roebuck on the examined territories *

	Tiszaalpár		Csongrád		Nagyszénás		Hódmezővásárhely	
	2008	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**
2007	χ^2=2,1 p=0,705	χ^2=6,4 p=0,171	χ^2=23,9 p=0,000	χ^2=15,7 p=0,003	χ^2=11,7 p=0,019	χ^2=9,4 p=0,052	χ^2=14,3 p=0,006	χ^2=19,3 p=0,001
2008	-	χ^2=2,5 p=0,634	-	χ^2=113,6 p=0,000	-	χ^2=33,5 p=0,000	-	χ^2=0,6 p=0,957

*: df=4, in all tests.

From the results we can state that the diversity of the food compound of doe on the examined territories is confirmed, the statistical difference in Tiszaalpár (between p=0.000 and p=0.021), in Csongrád (between p=0.000 and p=0.001) and in Nagyszénás (between p=0.000 and p=0.001), while it cannot be stated between the habitats of Csongrád and Hódmezővásárhely (in 2006 p=0.126; in 2007 p=0.767 and in 2008 p=0.676) (Figure 8).

Figure 8.

Annual comparison of the food components of doe on the examined territories *

	2006			2007			2008		
	Csongrád	**Nagyszénás**	**Hmvhely**	**Csongrád**	**Nagyszénás**	**Hmvhely**	**Csongrád**	**Nagyszénás**	**Hmvhely**
Tiszaalpár	χ^2=31,6 p=0,000	χ^2=198,4 p=0,000	χ^2=35,2 p=0,000	χ^2=23,1 p=0,000	χ^2=60,3 p=0,000	χ^2=19,5 p=0,001	χ^2=14,7 p=0,005	χ^2=111,1 p=0,000	χ^2=11,5 p=0,021
Csongrád	-	χ^2=74,6 p=0,000	χ^2=7,2 p=0,126	-	χ^2=19,8 p=0,001	χ^2=1,8 p=0,767	-	χ^2=41,7 p=0,000	χ^2=2,3 p=0,676
Nagyszénás	-	-	χ^2=20,2 p=0,000	-	-	χ^2=18,2 p=0,001	-	-	χ^2=20,4 p=0,000

*: df=4, in all tests.

In case of roebuck it is confirmed that the food components vary on different habitats but in 2009 in Csongrád and Nagyszénás differences were not detected statistically (χ^2=9,4; p=0.051). The hypothesis „a" – according to which the food preferences of the roe deer population on the examined territories differ in the hunting seasons of doe and roebuck according to the ecological conditions, agricultural cultivation and the rate of afforestation– was not confirmed on every occasion (Figure 9).

Figure 9

Annual comparison of the food components of roebuck on the examined territories *

	2007			2008			2009		
	Csongrád	**Nagyszénás**	**Hmvhely**	**Csongrád**	**Nagyszénás**	**Hmvhely**	**Csongrád**	**Nagyszénás**	**Hmvhely**
Tiszaalpár	χ^2=11,9 p=0,018	χ^2 =55,4 p=0,000	χ^2=41,2 p=0,000	χ^2=13,2 p=0,010	χ^2=63,7 p=0,000	χ^2=76,8 p=0,000	χ^2=23,5 p=0,000	χ^2=30,9 p=0,000	χ^2=78,8 p=0,000
Csongrád	-	χ^2=35,2 p=0,000	χ^2=35,6 p=0,000	-	χ^2=58,8 p=0,000	χ^2=253,8 p=0,000	-	χ^2=9,4 p=0,051	χ^2=47,4 p=0,000
Nagyszénás	-	-	χ^2=95,6 p=0,000	-	-	χ^2=123,8 p=0,000	-	-	χ^2=97,3 p=0,000

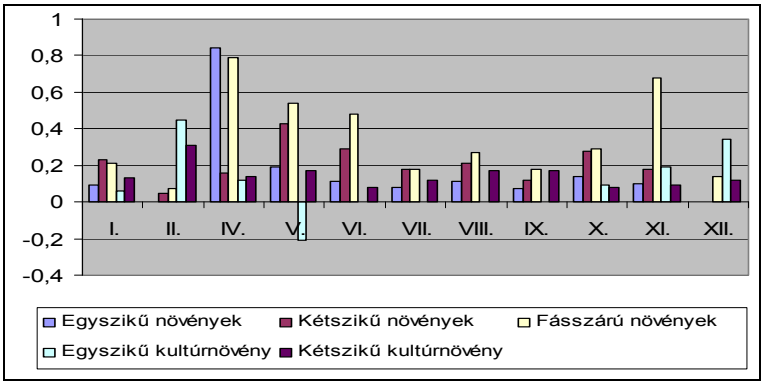
*: df=4, in all tests.

10. The food preference examination by roe deer dropped in Tiszaalpár showed that in the winter period the herbaceous mono- and dicotyledonous plants were not popular. But in spring time until August their preference is traceable, in April the preference of monocotyledonous plants was above all the other plants From September until November I measured high values while examining the mono- and dicotyledonous plants.

The preference of woody plants was high during the whole year, except in January and February, but in April (locust), May (elder) and in November their preference was significantly higher than consumption of the other plants.

The cultivated monocotyledonous plants were preferred, especially the fall cereals, in the periods when there was less food, in winter and in the beginning of spring.

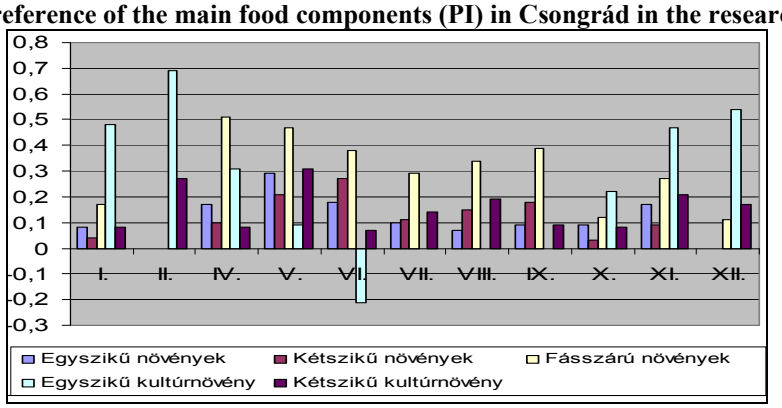
Figure 10: The preference of the main food components (PI) in Tiszaalpár in the researched years (n=53)



However in April and May the preference of the monocotyledonous cultivated plants was not quite clear, because their availability and consumption varied. In the beginning of April the fall cereal was preferred but in the end of April I could detect the avoidance of leafy corn. Later, from October the plants sown in fall were consumed again. The dicotyledonous cultivated plants were preferred almost all year long – except the alfalfa in winter – particularly consumed in April and May (Figure 10).

11. The food preference examination by roe deer dropped in Csongrád showed that in the winter period the herbaceous mono- and dicotyledonous plants were not popular. But in spring time until August their preference was high. From September until October I measured low values while examining the mono- and dicotyledonous plants, but their preference grew a little bit November.

Figure 11.: The preference of the main food components (PI) in Csongrád in the researched years (n=38)

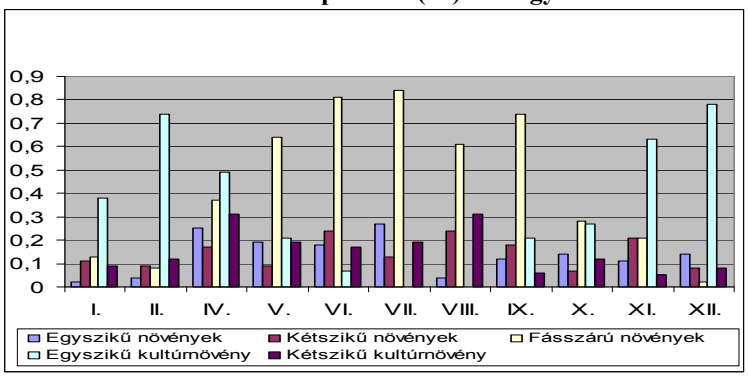


The preference of woody plants was high all year long, except in January and February, but in April (locust), May (elder) and in November their preference was significantly higher than consumption of the other plants, just like it was noted in Tiszaalpár.

The cultivated monocotyledonous plants were consumed in the periods of food shortage, mostly in winter and spring time. However in June the preference of the monocotyledonous cultivated plants was not quite clear, because their availability and consumption varied. In the beginning of April the fall cereal was preferred but in June I could detect the avoidance of these plants. This can be explained with the fact that after harvest the fall cereals were no longer available. Later, from the month October the plants sown in fall were consumed again. The dicotyledonous cultivated plants were preferred almost all year long – except the alfalfa in winter – particularly consumed in April and May. The high preference of alfalfa can be seen from May until September (Figure 12).

12. The comparison (PI) of the food component availability in Nagyszénás showed that in the winter period (in January and February) the herbaceous mono- and dicotyledonous plants were not popular. The preference of the monocotyledonous plants was high from spring until November. In case of the dicotyledonous plants the preference was observed from April until November (Figure 12).

Figure 12.: The preference of the main food components (PI) in Nagyszénás in the researched years (n=56)



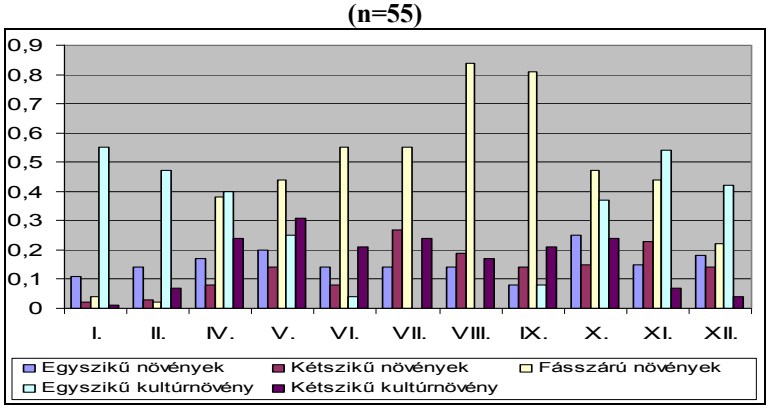
The preference of woody plants was high all year long, except in February, from April till September the locust's, from May until December the elder's preference was significantly higher ($p<0,05$) than the consumption of other plants.

The cultivated monocotyledonous plants were consumed in the periods of food shortage, mostly in winter and spring time. Later, the plants sown in fall were consumed again. High preference was shown towards winter wheat in December and towards the corn in October and December. The dicotyledonous cultivated plants were preferred almost all year long – except the alfalfa in fall and winter (Figure 12).

13. The comparison (PI) of the food component availability in Hódmezővásárhely showed that in the winter period (in January and February) the herbaceous mono- and dicotyledonous plants were not popular, but their preference from spring until December did not fall.

The preference of woody plants was high all year long, except in February, from April till August the locust's, from May until December the elder's preference was significantly higher ($p<0.05$) than the consumption of other plants (Figure 13).

Figure 13: The preference of the main food components (PI) in Hódmezővásárhely in the researched years (n=55)



The cultivated monocotyledonous plants were consumed in the periods of food shortage, mostly in winter and spring time. Later, the plants sown in fall, from October were consumed again. High preference was shown towards winter wheat in December and the corn in October and December. The dicotyledonous cultivated plants were preferred almost all year long – except the alfalfa in fall and winter. The preference of the alfalfa in the growing period, from May until September was higher than the preference of the locust (Figure 13).

14. On the studied plain habitats the consumption of the following woody plants was typical (2.40–12.26) the locust (*Robina pseudoaccacia),* the elder (*Sambucus nigra)* (3.12–19.93%) **MÁTRAI (**2000) high consumption 60-90% of conifers (*Pinus spp.)*, cherries' (*Prunus spp.),* mulberry (*Rubus spp.),* the honey locust (*Gleditsia triacathos)* apples and grapes was detected. **Tixier et al. (**1998) found the same dominant species in the winter food only in smaller quantities (1–3) and smaller rate (22–50%).

According to the researches of **MÁTRAI** (2000) on temporary habitats the presence of the main food components was even higher. Besides the conifers the maple (*Acer campestre)*, the oak and the ash (*Fraxinus spp.)*, the alfalfa (*Medicago spp.),* the carrot (*Beta spp.),* the honey locust (*Gleditsia triacathos),* the silver berry *(Elaeangus angustifolia)* were also present.

On the studied plain habitats the examined doe liked the monocotyledonous plants because I have found them in large quantities (40.15–74.14%) which were very important in the winter period, like in the studies of **MÁTRAI** (2000) where she stated the on field habitats the food selection of roe deer only differed in the consumed plants and not in their distribution. She stated that the dominant food components were the parsley (*Petoselium*

spp.), the carrot leaf (*Beta spp.),* the flowering plants (*Medicago spp. and Trifolium spp.),* the wheat (*Triticum spp.)* and the barley (*Hordeum spp.).*

While studying the food selection of roe deer on Moravian agricultural habitats **HOLISTOVA et al (**1982) received the same results in fall and winter periods, where the main food components were the winter cereals and the corn, but she also underlined the importance of mulberry (*Rubus spp.),* privet (*Ligustrum vulgare),* ash (*Fraxinus excelsior)* (47–68%).

15. Examining the food components of roebuck we can state that the rate of the monocotyledonous plants was low (2.32–29.06%), mostly were consumed the quitch grass (*Agropyron repens),* bermuda grass (*Cynodon dactylon)*, the sedge *(Carex spp.).* In the case of dycotiledonous plants I have found the same results (2.00–24.75%), the common bugloss (*Anchusa officinalis)*, the hairy vetch (*Vicia villosa),* the black horehound (*Ballota nigra)*, the goosefoot (*Chenopodium album),* the mullein (*Verbascum phlomoides),* the hawkweed oxtongue (*Picris hieracioides)*, the common gypsyweed (*Veronica officinalis)* were consumed.

The consumption of woody plants was dominant from spring till fall (24.86–52.80%), there were no significant differences between the years, mostly eaten plants were the black locust (*Robinia pseudoacacia)* and the elder (*Sambucus nigra),* these result correspond to the results of **STRANDGAARD** (1972) on agricultural habitats of Kalon (38–74%). According to the examinations made by **SZMIDT** (1975) the common beech (*Fagus sylvatica)* was the most preferred woody plant. The most disliked plants in the winter period were the pine (*Pinus sylvestris)* and the elder (*Sambucus nigra)*. The common beech was a favored species according to numerous writers (**WAGENKNECHT**, 1969) or at least it was consumed periodically (**KLÖTZLI,** 1965).

The elder was consumed less according to **PIELOWSKI** (1970), but also there were researchers who stated that it was a frequently consumed plant together with the pine (**KURT**, 1970).

KURT (1970) says that in spring and summer 62% of the consumed nourishment is of leaves and sprouts of woody plants and in winter period this rate can be even 80%, which cover not only the energy needs but also the water needs of roe deer, states **SZCZERBINSKI** (1964). In summer period this plant group provides 50% of the food consumed and it is very important in digestion regulation (**BUBENIK**, 1959).

The monocotyledonous crops were also preferred by roebuck, the common wheat (*Triticum aestivum)*, the barley (*Hordeum vulgara)*, the rye (*Secale cereale)* were also consumed as I have found them in large quantities in the samples (12.63–49.28%).

The rate of dicotyledonous crops was between 4.03–15.94%, mostly the fabaceae were consumed like: alfalfa (*Medicago sativa),* the white clover (*Trifolium repens),* the red clover (*Trifolium pratense),* and in spring the rape (*Brassica napus).*

But in spring and summer there was a great diversity in the samples in the same growing season I could find the consumption of 17–21 plant species – mostly dicotyledonous plants, the leaves and sprouts of woody plants and cultivated crops were dominant. On all territories there were 1–3 mostly preferred woody plants (acacia, elder, narrow-leaved willow, hackberry) which is almost similar to the result published by **TIXIER and DUNCAN** (1996), where the authors raised our attention to the fact that there is great diversity in the feed of roe deer on identical habitats. Their opinion is that plant species which can be found on the habitat significantly affect the food selection of roe deer. According to their results roe deer consumed 305 types of plants in the growing season the most preferred plants were the leaves and sprouts of woody plants.

16. On the Tiszaalpár territory the consumption of woody plants was high in spring-summer and also in fall-winter period (fall and winter: 39.55–46.74%, spring and summer: 48.99–52.80%). Because of the afforestation made in the last 30–40 years and the planted forest belts the rate of the forest cover today is over 30%. Most of the territory is mostly cover with poor sandy soil so many landowners decided to strengthen the quality which had a positive impact on the quantity and quality of the roe deer population.

17. On the territories of Csongrád, Hódmezővásárhely and Nagyszénás afforestation like in Tiszaalpár cannot be expected, that is why it is very important to form and maintain the woody vegetation on these regions. Special attention should be paid to the forest belts and tree groups which are hiding places of roe deer all year long, and also they consume the leaves and sprouts of the plants found here, **MAIZERET et al.** (1989) also notes this in her earlier studies. On these agricultural territories the crop production dominates. **SUGÁR** (2010) states that roe deer have special dietary needs, from the researches of **HOFFMAN** (1985) we know that roe deer are considered to be "concentrate selector ruminants". He is very choosy mostly prefers young plants with high water-, sugar-, protein- or fat content. Compared to the other cervids in Hungary the size of its craw (reticular rumen) is small. That is the reason why roe deer is grazing 12 times a day while the fallow and red deer only 6 times and the moufflon is just 3 times a day. However roe deer have large salivary glands which enable them to

consume fruit in big quantities. When the forest and meadow plants grow "older" – if lucky – roe deer can find cherries, strawberries, mulberries, apples and pears (**SUGÁR**, 2010).

18. According to the results achieved from different plain habitats I think that the statement of **TIXIER et al.** (1997) is justified, namely that the dominant plant species consumed by roe deer living on the same habitat are the same. It can also be stated that plants that can be found in abundance on the places of drop are the main food components of roe deer, similar consequence was drawn by **MÁTRAI** (2000) who examined roe deer on three different habitats. Her point of view is that in winter period in the forest and temporary habitats the more diverse flora composition was not reflected in the diversity and uniformity of food. This also proves that the 1–3 food choices of roe deer that are independent of the vegetation.

19. The food composition of doe in the examined years did not differ significantly in Tiszaalpár (between p=0.487 and 0.913) in Csongrád (between p=0.150 and 0.925) and in Hódmezővásárhely (between p=0.778 and 0.872), but on the Nagyszénás habitat there has been a statistical difference between the rate of food components in 2006–2007 (p=0.032) and in 2007–2008 (p=0.000).

After examining the roebucks I can state that only on Tiszaalpár habitat was the rate of the food components similar (between p=0.171 and 0.705), on the other territories the food composition was not the same in every year. This means that hypothesis "b" is confirmed only on one habitat.

20. On the four examined habitats with larger forest cover (Csongrád and Tiszaalpár) and with agricultural territories (Nagyszénás and Hódmezővásárhely) the consumption of woody plants was high all year round, so hypothesis "c" is confirmed.

21. We can state that after examining the main food components, the food selection of roe deer in the same year but on different territories was very diverse thanks to the conditions of the regions and their various food supply so in my opinion hypothesis "d" is also confirmed.

22. In the periods when there is less food, according to their results on different plain habitats we can say that the dominant plant species consumed by roe deer are similar, mostly those plants which can be found close to the place of drop. In fall and in winter the diverse plant composition was not reflected in the diversity and uniformity of food. That justifies the fact that the food selection of roe deer is directed on only few plant species. The feeding strategy was the same on all habitats: roe deer consumed those plants which were in abundance. They did not leave the forest or the agricultural areas to find easily digestible, nutritious perennial plants. According to the researches of **MÁTRAI** (2006) roe deer must

save energy in the winter, because of its smaller size needs more energy per body weight unit than the red deer. The search and consumption of easily digestible food was not typical on the examined plain habitats because these plants are not available all year long. In the periods of food shortage the consumption of easily accessible plants was dominant.

IV. THE NEW SCIENTIFIC RESULTS OF THE PAPER

1. Because of the small capacity of the digestive system the roe deer feed selectively in all seasons. They avoid several easily accessible plants besides a lot of different (10–15) plant species were independently found in the samples of the habitat and the season.

2. Roe deer living on agricultural territories in the fall winter period were concentrate selectors but they have also consumed easily accessible plants.

3. There was a large diversity in the food selection of individuals due to the different plant composition in the movement area during the examined time period

4. On woody habitats (like Tiszaalpár) the consumption of woody plants was dominant, but the varied food composition was not reflected to the diversity of food.

5. On the four examined plain habitats at different years but on similar territories the food composition of doe was significantly different on only one territory (Nagyszénás). This means that the available food on three territories (Tiszaalpár, Csongrád, Hódmezővásárhely) did not influence the rate of consumed food components.

6. On the four examined plain habitats in different years but on similar territories the food composition of roebuck was not significantly different except one territory (Tiszaalpár). This means that the available food on three territories (Nagyszénás, Csongrád, Hódmezővásárhely) did influence the rate of consumed food components by the roebuck.

7. Studying the main food components of doe and roebuck in the same year on different habitats I can state that almost in all cases there was a significant difference in the food composition. The different food supply in different years and different areas influenced the rate of consumed food components.

8. During the food preference examination I could see that in winter on all habitats the cultivated monocotyledonous crops were highly preferred. In those months when the food was in abundance the selective feeding of roe deer was obvious.

V. THE APPLICATION OF THE RESULTS IN PRACTICE

The results and new information achieved during the examinations of the food preferences of the roe can help the game managers' work on these territories. In Tiszaalpár the consumption of woody plants was highly important in fall and winter as well as in spring and summer periods. The forestations and the planted forest belts in the past 30–40 years helped to improve the quality of the roe population in this area. Most of the hunting ground is covered by sandy soil with low fertility, due to the favorable plantation programs many landowners decided to afforest their agricultural land. Consequently this area became a popular and very important habitat for roe deer and the population living there started to improve.

On the territories of Csongrád, Hódmezővásárhely and Nagyszénás such forestation process cannot be expected. On these territories the agricultural cultivation is dominant. As there will be no significant changes in the size of the wooded areas so it would be very important to maintain the woody vegetation on the examined territories. The concerned plant species were highly preferred and consumed by roe deer. In the growing season it was typical that 17–21 types of woody plants were consumed. On every territory there were 1–3 species which were highly preferred (acacia, elder, narrow-leaved willow, hackberry). But because of the small capacity of the digestive system roe deer is feeding selectively, avoiding a lot of accessible plants. Beyond this a high number of plant species (10–15) can be found in its food independently of the habitat and the period.

On these territories attention has to be paid to the habitat development: the vegetation has to spared and developed, game reserves, trees and bushes should be planted and ecotypes preferred by roe deer, where they can hide and consume the fresh sprouts of these trees, shrubs and bushes. Earlier several authors (**MÁTRAI,** 2006; **SUGÁR**, 2010) have raised our attention to the fact that roe have special dietary needs because of their specific digestive system. We can help to improve the quality and the quantity of the roe deer population by developing and maintaining long lasting woody vegetations. We also need to pay attention to the already existing woody vegetations, we have to manage and preserve them. While planting and developing the woody vegetation we have to pay attention to the proportion of preferred species (acacia, elder, narrow-leaved willow) and plants which require now plant protection, but also consumed by roe deer, like cherry-, apple- and pear trees. It is important to know the ripening time of fruit trees while planting them so from the middle of summer until the end of fall roe deer can find it to be beloved and often consumed food sources.

VI. PUBLICATIONS IN THE THEME OF THE DISSERTATION

REVIEWED SCIENTIFIC PUBLICATIONS

1. **Tamás Barta** (2006): The feeding of roe deer (*Capreolus capreolus*) on different habitats. Agricultural and Rural development review. Vol 1. 2006/1.:35-42. ISSN 1788-5345.
2. **Tamás Barta** (2007): The winter feeding of roe deer (*Capreolus capreolus*) on agricultural habitats. Agricultural and Rural development review 2007/2.:173-176.ISSN 1788-5345.
3. **Tamás Barta** (2007): The winter feeding of roe deer (*Capreolus capreolus*) on agricultural and forest habitats. Agronomics Publications 2008/31: 23-26. Acta Agrarica Debreceniensis.
4. **Tamás Barta** (2007): The winter and spring feeding of roe deer (*Capreolus capreolus*) on agricultural habitats. Agricultural and Rural development review. Vol 1. 2008/1.: 39. ISSN 1788-5345.
5. **Tamás Barta** –István Majzinger (2008): The spring and summer feeding of roe deer (*Capreolus capreolus*). Agronomics Publications, 2009/37: 13-16. Acta Agrarica Debreceniensis.
6. **Tamás Barta** –István Majzinger (2008): Examination of the food components and most important parameters of roebuck (*Capreolus capreolus*) in spring and winter on two field habitats. Agronomics Publications, 2010/40: 7-10. Acta Agrarica Debreceniensis
7. **Barta Tamás** (2011): Az őz táplálkozása az Alföldön. Magyar Biológiai Társaság Szegedi Csoportjának 424. szakosztályi ülése (A TUDOMÁNY EREJÉVEL A FENNTARTHATÓ VIDÉKÉRT). Hódmezővásárhely, 2011. november 4.
8. **Barta Tamás – Majzinger István** (2011): Examination of feeding and some population parameters of roe deer (*Capreolus capreolus*) on the Great Hungarian Plain. Agrár- és Vidékfejlesztési Szemle 6. évf. 2011/1. Conference CD supplement: 169-175. ISSN 1788-5345.

CONFERENCE PROCEEDINGS IN FOREIGN LANGUAGE

9. **Barta Tamás** (2007): Analysis of incomes and costs of game management in southern Hungary. International Scientific Symposium. Banat's University of Agricultural Sciences and Veterinary Medicine Timisoara. Management of Durable Rural Development. 277-282. ISSN: 1453-1410.

CONFERENCE PROCEEDINGS IN HUNGARIAN

10. **Tamás Barta** (2006): Research of feeding strategy of roe deer living in field area. XXXI. Science Day in Óvár, 5. Oct. 2006. Mosonmagyaróvár. Summarizing material of presentations and posters 23. (Complete material on CD). ISSN: 0237-9902.
11. **Tamás Barta** (2007): The winter feeding of roe deer (*Capreolus capreolus*) on agricultural habitats. IV International Scientific Conference of European Challenge. 12. October 2007, Szeged.
12. **Tamás Barta** (2008): The autumn and winter food preferences and the changing of the population parameters of doe (*Capreolus capreolus*) on floodplani and agricultural habitats. Hungarian Biological Society, Szeged, the 403. divisional meeting. 30. October 2008, Hódmezővásárhely.
13. **Tamás Barta** (2009): The spring and summer food preferences of roe deer (*Capreolus capreolus*) on floodplani and agricultural habitats. Hungarian Biological Society, Szeged, the 410. divisional meeting. 30. October 2009, Hódmezővásárhely.
14. **Tamás Barta** (2010): The food preferences of roe deer (*Capreolus capreolus*) on plain habitats. Hungarian Biological Society, Szeged, the 417. divisional meeting. 28. October 2010, Hódmezővásárhely.
15. **Tamás Barta** (2011): The food preferences of roe deer (*Capreolus capreolus*) on the Great Hungarian Plain. Hungarian Biological Society, Szeged, the 424. divisional meeting. (WITH THE POWER OF SCIENCE FOR A SUSTAINABLE COUNTRY) 04. November 2011, Hódmezővásárhely.