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Tab 1. Influence of the cultivation way on the grain yield in winter barley in year 1998/99

Variety	Way of cultivation	Yield t.ha^{-1}	Difference caused by the way of cultivation		
			t.ha^{-1}	%	*Sk*
LUXOR	A	7,61	-	100,00	-
	B	7,74	0,13	101,71	390
	C	7,87	0,26	103,42	780
HANNA	A	6,67	-	100,00	-
	B	6,52	-0,15	97,75	-450
	C	6,98	0,31	104,65	930
BABYLONE	A	6,76	-	100.00	-
	B	6,33	-0,43	93,64	-1290
	C	6,58	-0,18	97,34	-540

Hd $_{0,05}$: 0,20089 Hd $_{0,01}$: 0,25147

Tab.2: Influence of the cultivation way on the grain yield in winter barley in year 1999/2000

Variety	Way of cultivation	Yield t.ha^{-1}	Difference caused by the way of cultivation		
			t.ha^{-1}	%	Sk
LUXOR	A	7,64	-	100	
	B	8,30	0,66	108,6	2112
	C	8,61	0,97	112,7	3104
TIFFANY	A	7,64	-	100	
	B	7,51	-0,13	98,3	-416
	C	7,75	0,11	101,4	352
BABYLONE	A	7,71	-	100	
	B	7,91	0,20	102,6	640
	C	7,49	-0,22	97,1	-704

Hd $_{0,05}$ cultivation:0,67223, Hd $_{0,01}$ cultivation:1,13411

DEVELOPMENT OF MELLIFEROUS PLANT MIXTURES WITH LONG LASTING FLOWERING PERIOD

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Summary

In this project we would like to develop mixtures of melliferous plant species with long lasting flowering period to offer bee pasture for the honey bees and wild bees and for the protection and reconstruction of the original association of the eroded uncultivated lands. The reasons for the research are the foreseeable increasing amount of the fallow, the presently decreasing natural bee forage lands, and the increasing territories of the eroded uncultivated lands. The experiment was set in the two places. There have been 6 melliferous plant mixtures examined: 3 annual and 3 perennial, in four repetition.
The purpose of the examinations were to detect the flowering stages and fenological aspects of the species in the mixture, the soil covering and the weed suppression effect of the mixtures. We have examined the appropriate time of sowing of the mixtures and the optimal percentage of the components in the mixture.
Our examinations so far have resulted that our plant mixtures have been flowering continuously from the end of May ensuring good bee forage for the wild bees living on the territories and for the visiting honey bees as well. From the annual mixtures mustard and buchweat, from the perennials saintfoin, melilot and coronilla proved good weed suppressive effect and long flowering period.

Key words: Melliferous flora, fallow, plant mixture, beepasture, honey bees, wild bees

Introduction

In the course of our accession to the European Community nearly 200 000 ha arable land should be drawn out of cultivation. On the low productivity flat or mountain territories the moving can help in recreating the original association, the fertilisers and the oversowing sustain the degraded situation. On the uncultivated lands the invasion of the dangerous weed species can be prevented by the increasing the succession and with sowing seeds of the original association. (Fekete at al. 1997)
In this project we would like to develop mixtures of melliferous plant species with long lasting flowering period for the protection and reconstruction of the original association of the eroded uncultivated lands and to offer bee pasture for the honey bees and wild bees.
The reasons for the research are the foreseeable increasing amount of the fallow, the presently decreasing natural bee forage lands (Cserényi 1997), and the increasing territories of the eroded uncultivated lands.
The purpose of the examinations were to detect the flowering stages and fenological aspects of the species in the mixture, the soil covering and the weed suppression effect of the mixtures. We have examined the appropriate time of sowing of the mixtures and the optimal percentage of the components in the mixture.

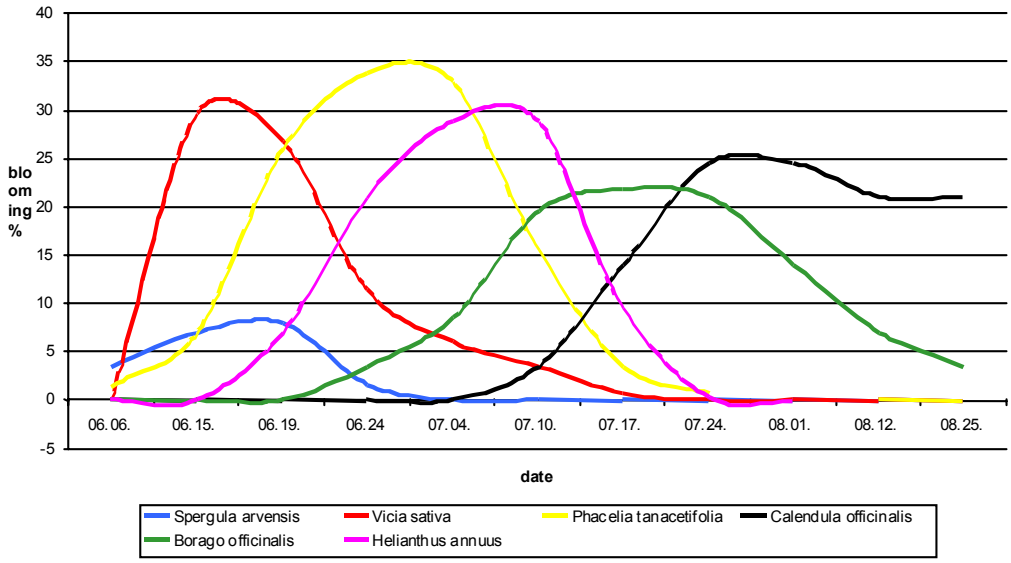
Material and methods

Places of the experiment: Place1. Experiment field of the Szent István University, Department of Ecological and Sustainable Production Systems, Soroksár Experiment Station , The soil was a light sandy soil, with low humus content (0,6-1%), and pH 7-8.
2. Putnok, Fleishmann Rudolf Experiment Station of Szent István University, Gödöllő. The soil was a heavy clay soil, with low pH 5-6 and low humus content.
Sowing method was by hand, on the surface. The seed of the species in the mixtures was mixed and sowed together in the same time on the surface. The soil preparation was similar as we sow grass. Date of sowing was: 29. April. The plots were $10m^2$ at Soroksár and $25m^2$ at Putnok in four repetition. The origin of the seed was from the Agrobotanical Institute, Tápioszele, OMMI, and Research Institute of Herbal plants.
After the mixtures were started to grow there were regular phenological examinations specially the flowering periods of the species, when the number of flowers and the blooming stage were detected. The occurence of the weeds and their soil covering percentage were also detected tree times a year according to Ujvárosi - Braun-Blanquet method.

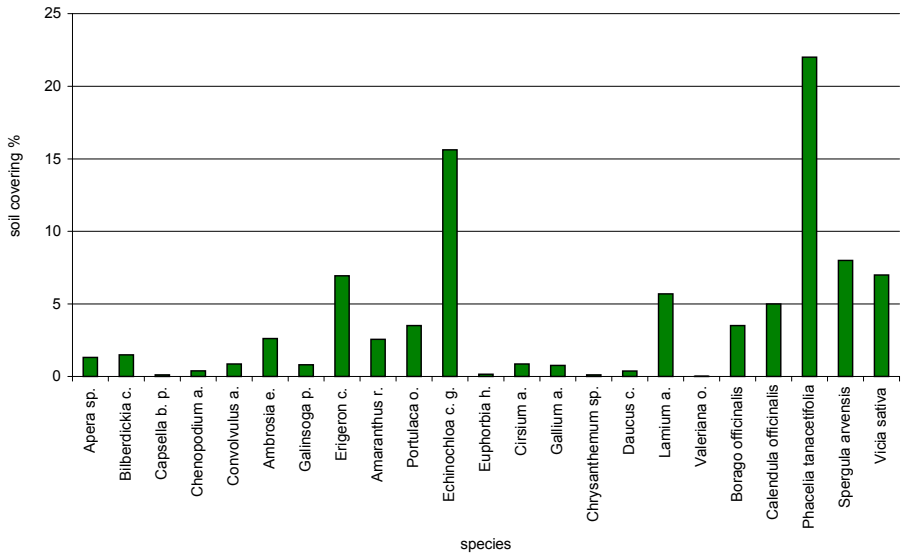
Results

Evaluation of Mixture 1.
Components in Mixture 1.: Sinapis alba, Fagopiron esculentum, Melilotus albus/Coronilla varia, Ocimium basilicum, Aster dumosus,/Callistephus, Carum carvi, Helianthus annuus
The main components of the spring aspect were buckwheat and mustard, gave an even continuous association on plots. Although the appearance of the turnip flea beetle damaged the mustard.
Because of the sowing happened in April the flowering period of the two species were almost in the same period. They gave good bee pasture after the black locust. The herbal plants could not detected in measurable level they were suppressed by filed species. Sunflower and Melilot was flowering in the middle and late summer. When melilot is in the first year it flowers at the end of the summer only, in the second year we can have two flowering time because of cutting.
Evaluation of mixture 2.
Components in M.2. Spergula arvensis, Vicia sativa, Phacelia tanacetifolia, Calendula officinalis, Borago officinalis Helianthus annuus, (Lupinus albus).
The first component in the early spring aspect is Spergula arvensis, corn spurrey. This small weakly structured plant is quite tolerant to the shortage of water so gave good soil covering and flowering in June. Facelia was main component for early summer covering the plot nicely and gave a very good intensive flowering period for the bees. Vicia sativa, common vetch could complete the flowering of facelia almost 80%. Borago officinalis, borage bring flowers according to the seed quantity in the mixture, was attractive for the bees. Calendula officinalis gave a continuous flowering from July but the bee-visitation was naturally less than on Facelia flowers. Sunflower was in low seed proportion in this mixture, and the performance was relevant to it.

Blooming period of 2. melliferous plant mixture Soroksár 1999



Soil covering of species of the 2. mixtures and weed species 1999.Juny 24.



Evaluation of the 3. mixture

Components in M.3.: Sinapis alba, Lathirus sativus, Melilotus albus/Coronilla varia, Majoranna officinalis, Calendula officinalis

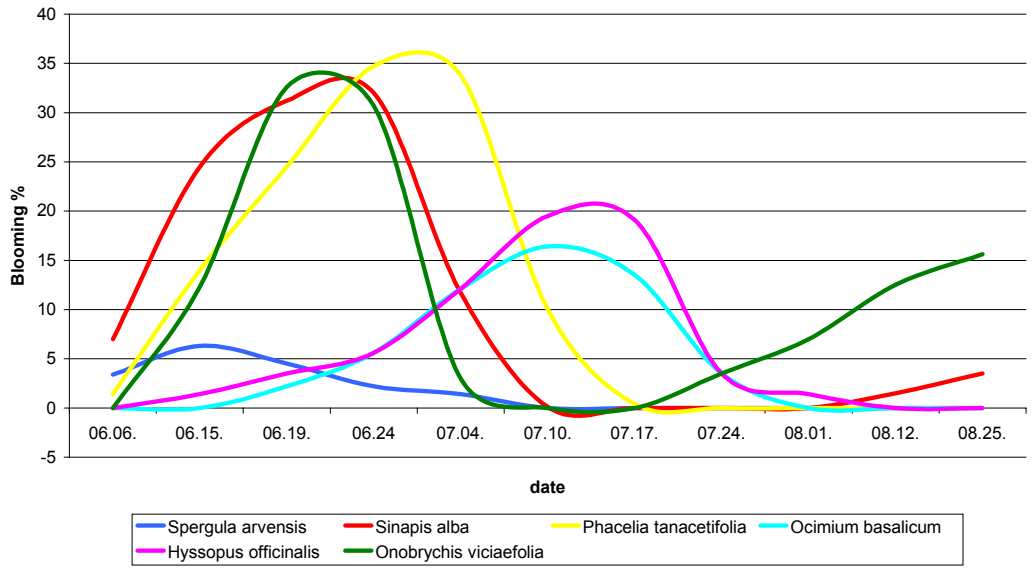
The main components of the spring aspect was Sinapis alba, mustard, gave an even but not continuous association with Lathyrus sativus on plots. The appearance of the turnip flea beetle damaged the mustard it had influenced the performance of flowering.

The sowing time was in April that resulted the flowering period of the two species were almost in the same period. They gave good bee pasture after the black locust for the honey bees and for the wild bees. From the species in this mixture Calendula, Melilot, and Malva sylvestris ensured reasonable bee pasture in July and August.

Evaluation of 4. Mixture

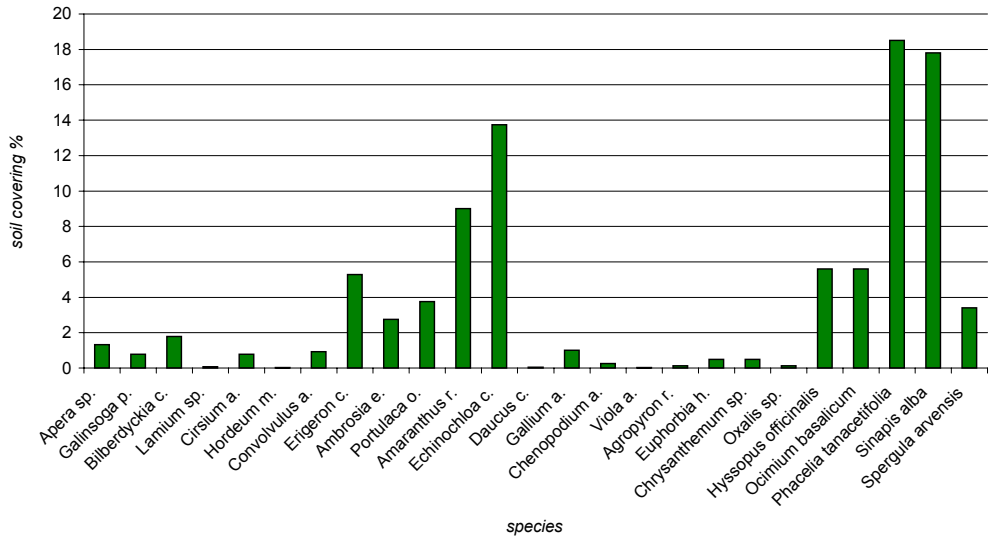
Components in M.4.: Spergula arvensis, Sinapis alba, Phacelia tanacetifolia, Ocimum basalicum, Hyssopus officinalis, Salvia officinalis , Onobrichis viciaefolia/Lupinus albus, Grass I. : Festuca rubra, Poa pratensis, Lolium perenne.

Blooming period of 4. melliferous plant mixture Soroksár 1999



The main components of the 4. mixture were Spergula arvensis, corn spurrey and mustard in the early spring aspect. They gave an even continuous association with the dominance of the mustard. Later Facelia covered the plot and gave very good abundance of flowers. Unfortunately the herbal species did not performed well, because the habitat of field plants. Onobrychis viciefolia, saintfoin give a nice flower amount at the end of summer in august in the first year. In the second year it flowered twice because of cutting : in June and from the mid of July-August. It gave a good, frequently visited bee pasture and suppressed the weeds. Grasses helped the soil covering of the mixture to suppress the weeds.

Soil covering of species of the 4. mixtures and weed species 1999.Juny 24.



Evaluation of the 5. mixture

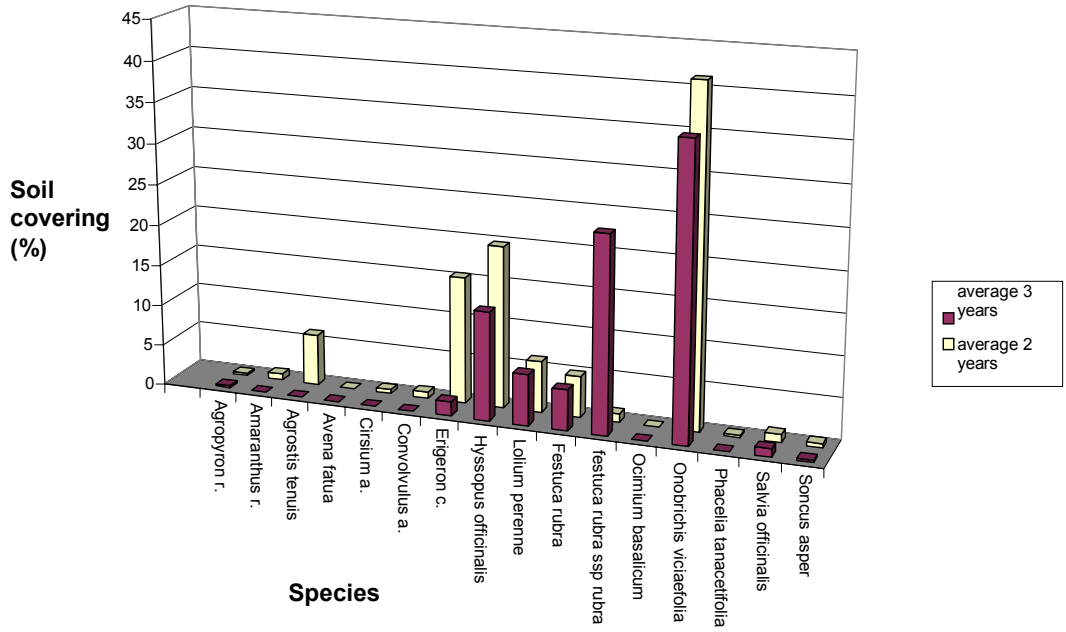
Components in M. 5. Sinapis alba, Melilotus albus/Coronilla varia, Fagopyron esculentum, Oreganum vulgare, Nepeta pannonica, Thymus vulgaris, Drakocephalum moldavica, Grass II.:Festuca rubra ssp Rubra, Festuca rubra ssp Commutata, Festuca rubra ssp Trichophylla

The main components of the spring aspect were buckwheat and mustard, gave an even continuous association on plots. Because of the sowing happened in April the flowering period of the two species were almost in the same period. They gave medium-good bee pasture after the black locust. Unfortunately turnip flea beetle damaged the mustard, this is why it was not attractive enough.

The herbal and ornamental plants could not detected in measurable level they were suppressed by filed species. Melilot was flowering in the middle and late summer. When melilot is in the first year it flowers at the end of the summer only, in the second year we can have two flowering time because of cutting, so it could elongate the flowering period of the mixture. Dracocephalum moldavicum a herbal plant in this mixture flowered in July and in August with moderate intensity because of seed quantity.

Evaluation of mixture 6.
Components in M6.: Sinapis alba, Fagopyron esculentum, Coronilla varia, Helianthus annuus, Calendula officinalis, Aster sp.
The main components of the spring aspect were buckwheat and mustard again, gave an even continuous association on plots. Because of the sowing happened in April the flowering period of the two species were almost in the same period. They gave medium-good bee pasture after the black locust. Turnip flea beetle also damaged the mustard here, this is why it was not attractive enough.
Coronilla varia flowered with low intensity in July and August in the first year, but in the second year it flowered in June, and in August too and gave nice abundance of flowers. It covered the soil very well and suppressed the weeds too.
The occurrence of wild bees: The most frequent wild bees and flies on the plots were: Erisyphus balteamus, Syrphus ribesii, Eristalix tenax, Andrena ovatula, Megachile argentea, Megachile rotundata, Bombus terrestris, Bombus agrorum
Figure 5.

Soil covering values of weed and cultivated plant species in mixture 5. (1999-2000.)



Discussion

From this two years experiment we could determine some those field, herbal and ornamental species that can tolerate growing in a mixture.
From the examined annual species we could suggest Spergula arvensis as early spring and Fagopiron esculentum, Sinapis alba for late spring. The most attractive species was facelia.
The perennial species gave better performance in the second year, but Onobrichis viciefolia, saintfoin was nicely flowering in the first year too.
From the herbal species Hyssopus officinalis could cope with the field species specially under dry conditions. We have to mention Borage, and Salvia although they were less intensive. According to our results so far we may plan annual and perennial mixture too. The most economic solution seems to be when the annual components gradually go into a perennial association like in mixture 4.,5.,6.
The quantity of the seeds of species in the mixtures is still under examination, because the percent of the herbal plants were lifted and the ratio of some perennials (like melilot) were decreased. This resulted better performance for the herbal species also they does not really competitive with filed species.

When these mixtures entered into the second year only those have given proper performance which contain perennial species : Onobrichys viciefolia on sandy soil, with 7-7,5pH, and Melilotus albus, or Coronilla varia for clay soil with low pH. For the third year grass species have gain territory Festuca rubra and subspecies, which are also components of the perennial mixtures. The evaluation of the third and second year old mixtures are shown on Figure 5.
This experiment is planned for longer period, because weather soil, seed quality has influenced our results, and prevented us to do all the planned examinations related to nectar and pollen productivity of the species in mixture.
Different ecological circumstances of areas need different kind and composition of mixtures we composed 6 mixtures suitable for sandy soil and the composition was modified for heavy clay soil with low pH.

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DYNAMICS OF UPTAKE AND ACCUMULATION OF NITROGEN BY WINTER WHEAT VEGETATION

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Summary

An influence of differentiated nitrogen doses on the dynamics of uptake and accumulation of nitrogen by the winter wheat vegetation was observed during the period of 1987-1989. The results were obtained from field experiments established at two experimental stations of UKSUP (Central Control and Examination Agricultural Institute) in Veľké Ripňany (172 m above sea) and in Báhoň (159 m above the sea). It was found out that at high grain yields in Veľké Ripňany the differences in the positions of the uptake line are not as significant as in the case of Báhoň locality. It is a result of a high level of mobile available nitrogen in soil, accumulated by lucerne which eliminates the effect of the applied nitrogen doses. Grain yield in Báhoň corresponds with the uptake lines of nitrogen. Significant statistical differences have been detected in each year from the period of shooting (r_{1987} =0.73^{++}, r_{1988} = 0.82^{++}, r_{1989} = 0.76^{++}) up to the full maturity (r_{1987} = 0.97^{++}, r_{1988} = 0.98^{++} , r_{1989} = 0.98^{++}) . Compared to the non-fertilized control, the vegetation which was nitrogen fertilized took up at the end of tillering more nitrogen by 4.2 - 13.4 kg N.ha^{-1}, at the beginning of shooting by 21.3 -35.7 kg.ha^{-1}, at the end of shooting by 13.5 - 74.8 kg.ha^{-1} and in milk maturity by 22.8 - 105.4 kg N.ha^{-1}.

Key words*: nitrogen, winter wheat, uptake, biomass, yield*

Nitrogen holds an unreplaceable position in the plant nutrition, compared to other nutrients it has the greatest influence on the quantity and quality of the yield. The higher are the requirements on the yield, biomass production, the more nutrients are transported from the soil and these need to be replaced by fertilization. Targeting influence on the production process course, and simultaneously meeting environmental protection requirements, can be carried out only via scientifically proven plant nutrition in a complex of other environmental determinants (*Bízik 1989; Ložek 1998; Jolankai and Ragasits 1995*).
The article deals with processed results of a study on the influence of differentiated fertilization on the nitrogen uptake and accumulation dynamics in the Viginta variety of winter wheat vegetation at regular sampling of soil and plant in three growing periods of year 1987, 1988 and 1989.

Material and methods

The results were obtained from field experiments established at two experimental stations of UKSUP (Central Control and Examination Agricultural Institute) in Veľké Ripňany and Báhoň where gradually increasing nitrogen doses and five authors methodologies for evaluation of nitrogen nutrition status for wheat fertilization needs were tested. In Veľké Ripňany the experiment was set up on brown soil, foreplant was lucerne, in Báhoň it was set up on black soil, foreplat was winter wheat. An overview of nitrogen fertilization treatments, nitrogen doses and attained grain yields of winter wheat are presented in table 1. Phosphorus and potassium fertilization was in all treatments applied in the same doses determined by the fertilization plan, except for treatment 8 and 9, where based on the plant analysis fertilization by foliar application of Fostim was carried out.

Table 1 Influence of differentiated conditions of N nutrition on the yield and natural grain