

Sowed pastures in the South-Eastern Romanian Plain

ABSTRACT

The objective of this study was the identification of the mixtures with good of traits for provide some high quality fodders, in adequate quantity too, and the tilled areas sowed with pastures are even larger. Previously, most farms in the area were cultivated only by alfalfa (the most important fodder variety in the area). Lately, there have been sowed pastures with variety mixtures (Graminaceae and Leguminous varieties) which have superior fodder value. This is possible as better adjusted to the natural conditions specific to the area. The results obtained in the first year of exploitation (2016) characterized by climate conditions over the area average show that the medium annual production of the three mixtures reached the value of 88.7 t/ha, having the same level as the yields obtained by an alfaalfa fodder crop (*M. sativa*), a normal crop for this area. The highest part of the year yield was achieved with the first two reapings over 60% from the total. The shortage of uniformity for the climate factors during the vegetation period leads to a non- uniformous distribution of the yield on reapings. Also, the yield obtained with the 3rd mixture is lower (84t/ha) as a consequence of the white trefoil. (*T. repens*) lower adjustment to the droughty climate conditions.

Keywords: Artificial Pasture, Sowed pastures ,Temporary pasture

1- INTRODUCTION

Some centuries ago in the South –Eastern part of Romania was covered with large grass areas characteristic to steppe area equivalent to savanna, prairie, and pampas [1]. Mixed cropping,

also known as polyculture, inter-cropping, or co-cultivation, is a type of agriculture that involves planting two or more plants simultaneously in the same field, interdigitating the crops so that they grow together. In general, the theory is that planting multiple crops at once saves space since crops in the same field might ripen at different seasons, and provides a wealth of environmental benefits. Documented benefits of mixed cropping include the balance of input and outgo of soil nutrients, the suppression of weeds and insect pests, the resistance of climate extremes (wet, dry, hot, cold), the suppression of plant diseases, the increase in overall productivity, and the management of scarce resources (land) to the fullest degree [2]. Agronomists studying mixed crops have had mixed results determining if yield differences can be achieved with mixed versus monoculture crops. For example, a combination wheat and chickpeas might work in one part of the world, but it might not work in another. But, overall it appears that measurably good effects result when the right combination of crops are cropped together. Mixed cropping is best suited for small-scale farming where harvesting is by hand. It has been used to improve income and food production for small farmers and lessen the likelihood of total crop failure—even if one of the crops fail, the same field might still produce other crop successes [3]. Mixed cropping also requires fewer nutrient inputs such as fertilizers, pruning, pest control, and irrigation than does monoculture farming. There seems to be no doubt that the practice provides a rich biodiverse environment, fostering habitat and species richness for animals and insects such as butterflies and bees. Some evidence suggests that polycultural fields do produce high yields compared to monocultural fields in certain situations, and almost always increase biomass richness over time. Polyculture in forests, heathlands, grasslands, and marshes has been particularly important for the regrowth of biodiversity in Europe. A recent study (Pech-Hoill and colleagues) was conducted on the tropical American perennial achiote (*Bixa orellana*), a rapidly growing tree that has a high carotenoid content, and a food dye and spice in small farming cultures in Mexico. The experiment looked at achiote as it is grown in different agronomic

51 systems—intercropped polyculture, backyard cultivation including poultry farming, and a wide
52 range of plants, and monoculture. Achiote adapted its mating system depending on which type of
53 system it was planted in, specifically the amount of outcrossing that is seen. Further research is
54 required to identify the forces at work [4-6].

55 As these large field areas have been sowed with specific agricultural crops. The areas left
56 with the initial vegetation (steppe) have significantly diminished below 5% [7]. These areas
57 are generally present with river meadows that cross the area or with areas provided with high
58 natural slope which don't allow mechanized agricultural works [8-10]. The results of
59 previously study showed that the production potential of these steppe natural pastures is very
60 low [8, 12]. For this reason, in order to protection of local herbivorous animals with
61 necessary fodders, ever larger areas from the cropped area (tillable area) are sowed with
62 fodder mixtures made of perennial graminaceae and leguminous varieties with superior
63 fodder value and high production potential. To this end, there are tested different types of
64 graminaceae and leguminous mixtures within specific research programs, and also the best
65 adjusted to specific natural conditions of the area are considered. The objective of this study
66 was the identification of the mixtures with this kind of traits and meeting this major practical
67 important desideratum.

68 2- MATERIALS AND METHODS

69 The research done in the experimental didactical field from Moara Domnească, Ilfov
70 country, agricultural farm of USAMV Bucharest. The first year of exploitation was 2015 that
71 experiment began the same year. There are tested 3 mixtures of perrennial fodder varieties
72 (graminaceae and leguminous) made of two graminaceae varieties (*Dactylis glomerata* and
73 *Festuca arundinaceea*) and two leguminous varieties (*Medicago sativa* and *Trifolium repens-*
74 *Ladino*) with participation shares in different mixtures (Table 1). The mixtures are
75 maintained and exploited according to technological norms specific to these crop areas. The

76 mixtures with *Medicago sativa* (1 and 2) are about to be used only by threshing, while
 77 mixture no. 3 with *Trifolium repens* – *Ladino*, is more appropriate to exploitation by grazing.
 78 The presence of *Festuca arundinacea* varieties in the 2nd and the 3rd mixtures aims at testing
 79 its good adjustment to the droughty climate conditions specific to the area.

80 In terms of climate, this area is the driest area in Romania: The medium multiannual
 81 temperature is 11.5 °C. The coldest month of the year is January with -4 °C, and the warmest
 82 months is June, July and August with over 21.2 °C; 23.1 °C and 22.1 °C, respectively.
 83 Medium high temperatures in summer months trigger high water shortages in the soil with
 84 significant effect over the production level.

85 Multi-annual medium rainfall reach 428 mm/year and don't have a uniformous
 86 distribution. The droughtiest months of the year are January/February and August/
 87 September. The period with the most important rainfall is May/ June/ July, but these ones are
 88 most of the times torrential. The low rainfall volume in the vegetation period (April-
 89 September), with a total amount of 290 mm and with their dominant torrential characteristics
 90 lead to the water waste by leaking at the surface or evaporation. These climate traits
 91 characterize the area as droughty with negative impact on the productions level. In the
 92 irrigations absence, the solution to obtain good yields for perennial fodder mixtures is the
 93 choice of some varieties with better adjustment to these conditions.

94 **3- RESULTS AND DISCUSSION**

95 In order to test the production potential of the three mixtures over 4 years of exploitation
 96 (2016-2019), one reaps the grass from the mixtures in blooming/ early florescence for both
 97 leguminous *M. sativa* and *T. Repens*. The year 2016 is the first year for testing the production
 98 potential of mixtures, and the results of test in this year showed in Table 1.

99

Table 1: Green mass yield on reapings and year in 2016 (t/ha)

No.	Mixture	Share in the mixture (%)	Yield on reaping				Year
			c1	c2	c3	c4	
1	<i>Dactylis glomerata</i>	40	28	25	20	15	88
	<i>Medicago sativa</i>	60					
2	<i>Dactylis glomerata</i>	20	31	26	21	16	94
	<i>Festuca arundinaceea</i>	20					
	<i>Medicago sativa</i>	60					
3	<i>Dactylis glomerata</i>	40	30	21	18	15	84
	<i>Festuca arundinaceea</i>	30					
	<i>Trifolium repens-</i>	30					
	<i>Ladino</i>						
Mixtures average			29,7	24	19,7	15,3	88,7

All mixtures had green mass yields over 8t/ha. This yields level is close to the one of the alfaalfa yield (*M. sativa*), usual fodder crop for this geographical area. The higher productions were found with the alfaalfa mixtures (*M. sativa*) respectively 88 t/ha –the 1st mixture and 94 t/ha the second mixture .The 3rd mixture with white trefoil (*T. repens*) achieved only 84t/ha. The lower yield of this mixture is led by the fact that the leguminous variety (*T. repens*) is weaker adjusted to the drought conditions by comparison with *M. sativa*.

The highest productions were obtained with the first reaping (between 28-31t/ha) followed by the second reaping with 21-26t/ha. The medium yield on reaping obtained from the three mixtures is of 29,7-24-19,7 and 15,3t/ha green mass.The average production reached the amount of 88,7t/ha. Green mass yield distribution on reapings was not uniformous, and the results are presented in Table 2.

Table 2: Green mass yield share on reaping

Amestecul	c1	c2	c3	c4
1	32	28	22	18
2	33	27	22	18
3	35	25	21	19

The highest share in the total yield which the 1st reaping has is over 30% (32-35). The 2nd reaping has a share over 25% (25-28). The 1st and the 2nd reapings have a significant share, namely a value of over 60%. This value is determined by the water reserve in the soil as a consequence of the snow melting and of the moderate temperatures of the spring months (March, April and May). The lower share of the 3rd and 4th reapings is determined by the drought in the summer months associated with the air medium temperatures of over 20 °C, fact which leads to a very high evapo-transpiration.

4- CONCLUSIONS

The results obtained in the first year of exploitation (2016) characterized by climate conditions over the area average show that the medium annual production of the three mixtures reached the value of 88.7 t/ha, having the same level as the yields obtained by an alfaalfa fodder crop (*M. sativa*), a normal crop for this area. The highest part of the year yield was achieved with the first two reapings over 60% from the total. The shortage of uniformity for the climate factors during the vegetation period leads to a non-uniform distribution of the yield on reapings. Also, the yield obtained with the 3rd mixture is lower (84t/ha) as a consequence of the white trefoil (*T. repens*) lower adjustment to the droughty climate conditions. By setting up pastures sowed with perennial graminaceae and leguminous mixtures, one obtains yields at least equal with the ones obtained with a crop only of alfaalfa (*M. sativa*) specific to the area and with superior quality traits.

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