



Workshop: Plant Proteins – Agronomic practices and environmental benefits

FIXED NITROGEN IN THE GRASSLANDS OF ROMANIA

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INTRODUCTION

Nitrogen is considered to be one of the basic elements that assure and sustain life on Earth, being encountered in almost all natural environments.

In the natural grassland rhizosphere, the amount of nitrogen varies between 4500 - 24000 Kg/ha (Henzell and Ross, 1973). After the atmosphere, the largest reservoir of nitrogen is found in the grassland (Stevenson and Cole, 1999). According to O'Connor (1983), nitrogen in natural grassland ecosystems is differentiated according to the floral structure of vegetation and its morphology. Thus, the highest amount of nitrogen (between 10.0 - 20.7 g/m²) was highlighted in the root system of grassland vegetation.

Terrestrial vegetation studies, based on satellite information, have shown that in the desert areas nitrogen is practically non-existent, and in tropical and temperate vegetation, the nitrogen content varies between 0.2-0.7 Kg N/m². An overall estimate of the amount of nitrogen stored in terrestrial vegetation shows that it falls within the range of 10-16 Pg (Lin et al., 1999).

THE STRUCTURE OF AGRICULTURAL CROPS IN ROMANIA, CULTIVATED IN ARABLE LAND

A) In Romania

B) Worldwide

Structure of crops	Milion hectars	%	Structure of crops	Milion hectars	%
Cereal crops(wheat, barley, two row barley)	5.19	62	Cereal crops(wheat, barley, two row barley)	692	48
Leguminous crops (soybean, peas, beans)	0.11	1	Leguminous crops (soybean, peas, beans)	159	11
Temporary grassland crops/Annual and perennial fodder crops	0.87	10	Temporary grassland crops/Annual and perennial fodder crops	202	14
Various cultures	2.16	26	Various cultures	303	27
TOTAL cultivated area	8.33	100	TOTAL cultivated area	1442	100

STRUCTURE OF AGRICULTURAL LAND IN ROMANIA AND THEIR SHARE TO UE COUNTRIES

Structure of agricultural land	Share of the total area of the country		Share to EU		Agricultural surface/inhabitant (ha)	
	Mil. ha	%	%	Position	RO	UE
Agricultural land	14.6	61	7.4	6	0.63	0.28
Arable land	9.4	39	7.3	6	0.39	0.21

STRUCTURE OF PERMANENT GRASSLAND IN ROMANIA AND ITS POSITION TO THE EUROPEAN UNION (DRAGOMIR N., 2018)

Year	Structure of permanent grassland in Romania					Position to EU		
	Total surface		From which		Ha grassland/ inhabitant	% from total grassland	Ha grassland/ inhabitant	Posi tion
	Million ha	%	Pas tures	Mea dows				
1989	4,40	100	3,04	1,36	0,19	-	-	-
2018	4,81	109	3,61	1,20	0,22	8,44	0,14	4

ZONAL DISTRIBUTION AND PRODUCTION OF ROMANIA PERMANENT GRASSLAND, IMPACT OF LIMITATIVE FACTORS ON THE DEGREE OF USE (DRAGOMIR N., 2018)

Zone relief	Total surface		Surface affected by limiting factors		Remaining surface for use		Production of Green Mass/ Dry Matter		
	Million hectars	%	Mii hectars	%	Million hectars	%	Thousand tones		%
							G.M.	D.M.	
Plain	0,60	12	60	10	0,54	13	2700	729	11
Hill	2,53	53	380	15	2,15	52	15050	4063	64
Mountain	1,68	35	336	20	1,48	35	5920	1598	25
TOTAL	4,81	100	776	16	4,17	100	23670	6390	100

ESTIMATED PROTEIN PRODUCTION OF FODDER CROPS IN ROMANIA(DRAGOMIR N., 2018)

Crops	Surface million ha	Biomass production (t/ha SU)	Conversion coefficient	Protein production (t/ha)	Total protein quantity (thousand tone)	%
Alfalfa	0,40	8	0,22	1,76	704	28
Other annual and perennial legumes (vetches, red clover, sainfoin, trefoil, etc.)	0,20	7	0,20	1,40	280	11
Temporary grassland	0,40	7	0,18	1,26	504	20
Permanent grassland	4,81	1,5	0,14	0,21	1010	41
Total	5,81	X	X	X	2498	100

ESTIMATED RESULTS OF REQUIRED AREA TO PRODUCE 1 KG OF ANIMAL AND VEGETABLE PROTEINS, UNDER SPECIFIC CONDITIONS OF ROMANIA, AT FORAGE CROPS AND GRASSLAND(DRAGOMIR N., 2018)

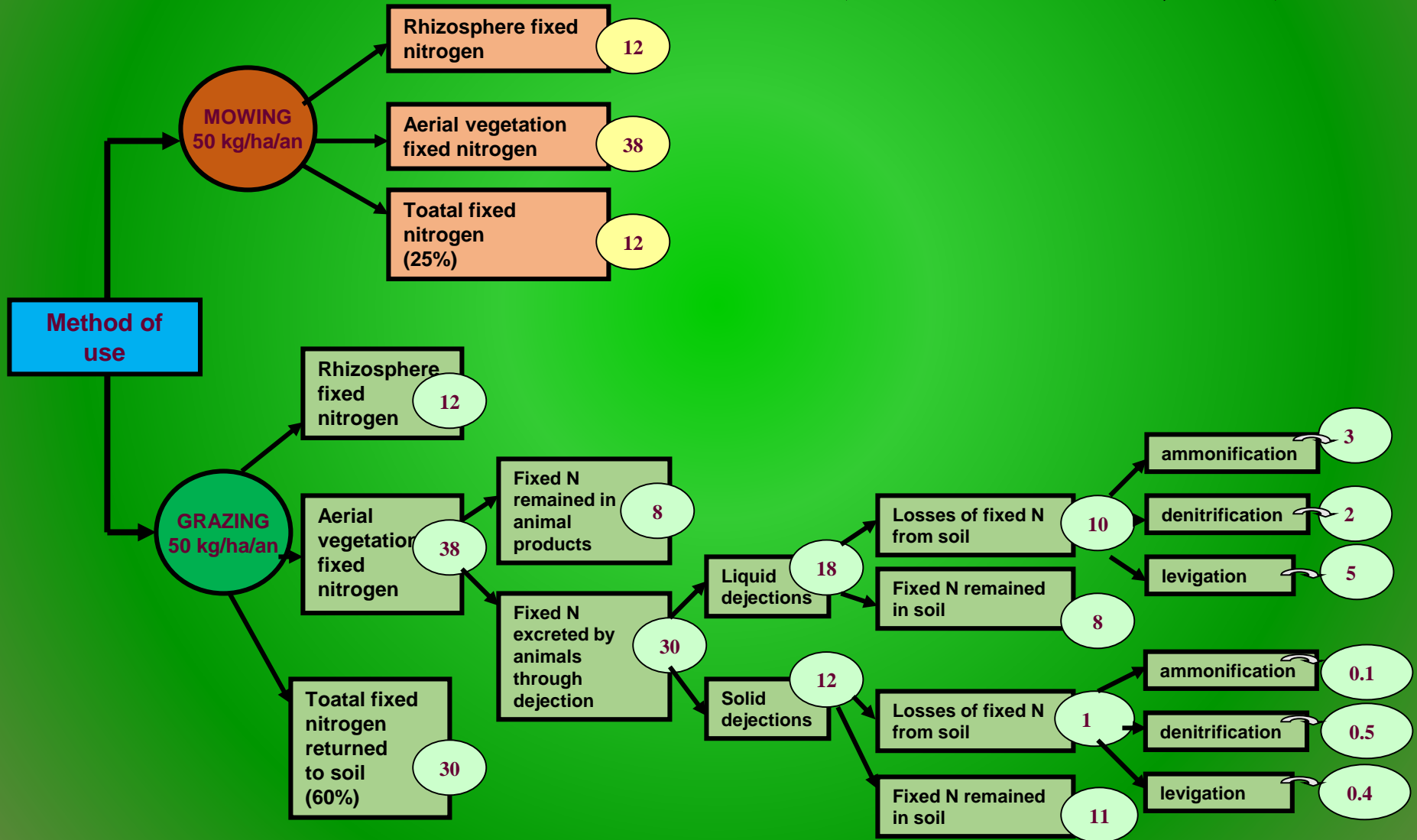
Vegetable proteins		Animal proteins	
Feed source	Surface (m ²)	Animal products	Suprafața (m ²)
Alfalfa	4	Cow milk	70
Other legumes (clover, sainfoin, trefoil)	6	Sheep milk	200
Soy bean	6	Beef	300
Temporary grassland (sown)	7	Sheep meat	220
Associated crops (annual legumes + cereals)	9	Pork Meet	200
Peas grains	10	Poultry meat	130
Permanent pasture (improved)	13		

THE ESTIMATED BIOLOGICAL FIXED NITROGEN (BNF) IN THE ROMANIAN FORAGE AGROECOSYSTEMES (DRAGOMIR N., 2018)

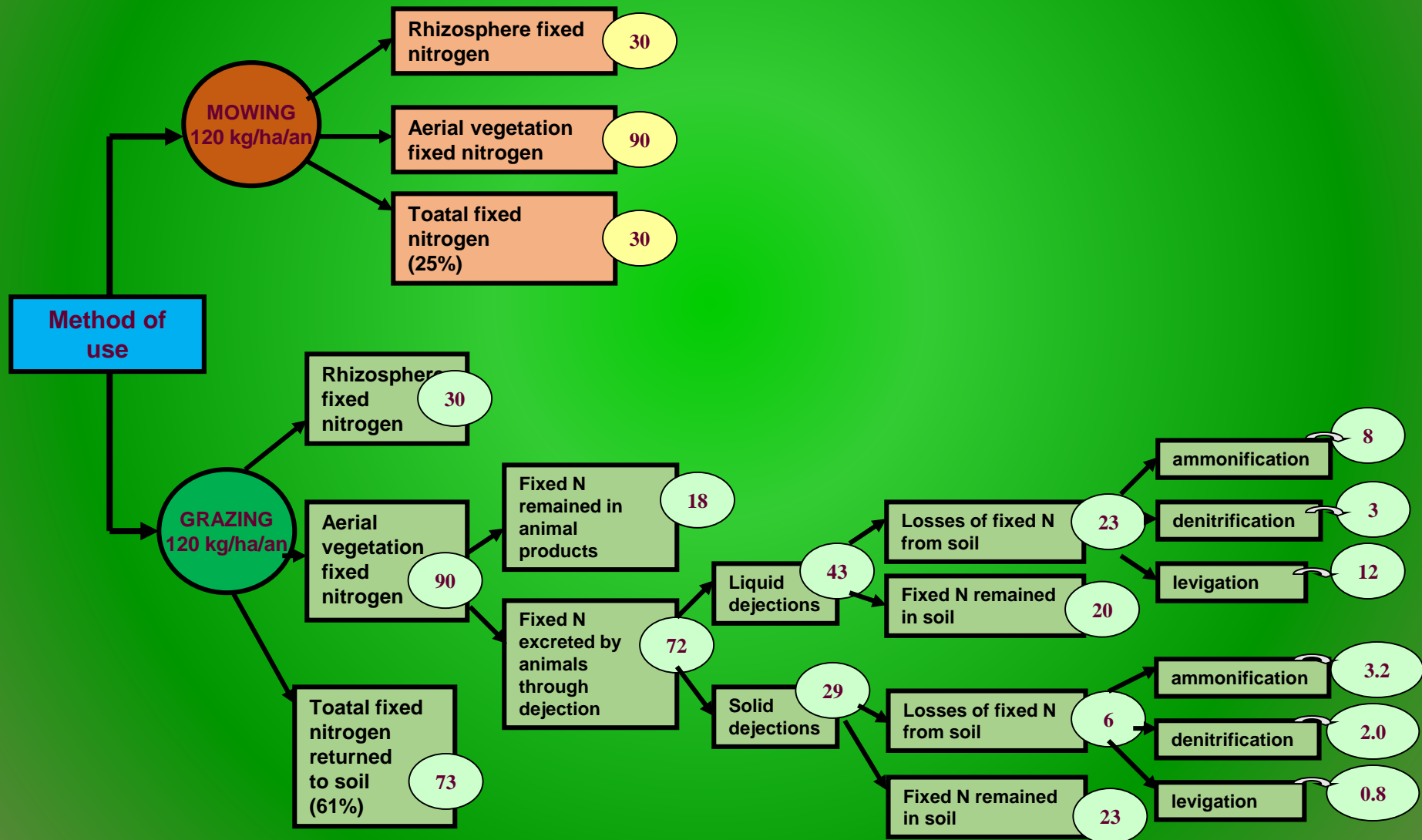
Crop structure	Surface (mil. ha)	Average amount of fixed N*) (Kg / ha)	Total quantity of fixed N (thousand tons / year)	The amount of N fixed in the soil (thousand tons)	The amount of fixed N available for crops under rotation (kg/ha)
Permanent grassland	4,81	50	241	60	13
Temporary grassland	0,40	120	48	12	30
Perennial legumes crops (alfalfa, red clover, sainfoin, trefoil)	0,50	160	80	20	40
Annual legume crops (vetch, peas, lupines)	0,10	140	14	4	40
TOTAL/AVERAGE	5,81	112	383	96	37

*) Estimation of the fixed N quantities was achieved by indirect quantitative methods (nitrogen balance, nitrogen difference, proportion of leguminous species)

THE ESTIMATIVE BALANCE OF THE BIOLOGICAL FIXED NITROGEN QUANTITY (BFN kg/ha/year), UNDER PERMANENT GRASSLAND CONDITIONS OF ROMANIA, BY THEIR USAGE (DRAGOMIR N., 2018)



THE ESTIMATIVE BALANCE OF THE BIOLOGICAL FIXED NITROGEN QUANTITY (BFN kg/ha/year), UNDER TEMPORARY GRASSLAND CONDITIONS OF ROMANIA, BY THEIR USAGE (DRAGOMIR N., 2018)



THE ECONOMIC VALUE OF THE BIOLOGICAL FIXED NITROGEN (BNF) IN THE ROMANIAN FORAGE AGROECOSYSTEMS (DRAGOMIR N., 2018)

Grassland structure	The average economic value of fixed N quantity		The total economic value of the fixed N quantity (Milions)		The economic value of the fixed amount of N*) left in the soil (Milions)		The economic value of the fixed N quantity available for crops in rotation	
	Lei/ha/year	Euro/ha/year	Lei/year	Euro/year	Lei/year	Euro/year	Lei/year	Euro/ha
Permanent grassland	175	38	841	180	210	45	45	10
Temporary grassland	420	90	168	36	42	9	105	23
Perennial legumes crops (alfalfa, red clover, sainfoin, trefoil)	558	120	279	60	70	15	140	30
Annual legume crops (vetch, peas, lupines)	490	105	49	11	14	3	140	30
TOTAL/AVERAGE	411	88	1334	287	336	72	108	23

*) In the case of permanent and temporary grasslands, the amount of N fixed in the soil is used by the non-leguminous plants of the floral composition in the following years of vegetation

THANK YOU
FOR YOUR
ATTENTION!