

Establishing Optimum Time for Foliar Fertilisation in Alfalfa

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Abstract

Foliar fertilisation is part of the conventional fertilisation integrated system in crops. Foliar fertilisers, due to the large number of macro-elements and microelements that make up their chemical composition, play an important role in plant nutrition ensuring high quality yields. This paper presents the differentiated effect of applying foliar fertilisers on alfalfa depending on application time after mowing.

Keywords: alfalfa, foliar fertilisers, application interval, dry matter.

1. Introduction

Foliar fertilisation consists in applying complex substances made up of macro- and micro-nutrients, humic acids, aminic acids, vitamins, and hormones.

The advantage of these nutrients consists in their quick absorption through the leaves, their translocation within the plants and direct participation in photosynthesis. Foliar fertilisers applied on alfalfa have a positive influence on plant growth and development and, finally, on plant and seed yield [1-4].

The paper points out the results of applying foliar fertilisers on fodder alfalfa yield when applied at different times of plant development.

2. Materials and methods

Research was carried out between 2013 and 2015 on the experimental field of the S.C.D.C.B. Arad. Alfalfa was sown in September 2013, and foliar fertilisers were applied during the first two vegetation years. The experimental setting relied

on two factors: **A.** time of application of the fertiliser (**a1** – one week after mowing, **a2** – 2 weeks after mowing); **B.** treatments (**b1** = no fertilisation, **b2** = Nitrocalcar-N50, **b3** = Cropmax – 0.5 l/ha, **b4** = Nitrocalcar+Cropmax, **b5** = Agroleaf – 3 kg/ha, **b6** = Cropmax+Agroleaf).

Cropmax is a super-concentrated foliar fertiliser containing growth enhancers, vitamins, polysaccharides, enzymes, and macro- and micro-elements. It ensures quick development of the root system and stimulates the growth of the foliar system.

Agroleaf Power contains macro- and micro-elements. It ensures quick development of the root system and stimulates the growth of the foliar system.

Agroleaf Power contains macro- and micro-elements, compounds of the M-77 type that stimulate the absorption of nutrients and enriches the photosynthesis.

In 2014, a year that was more favourable to alfalfa crops, they mowed three times, while in 2015 they mowed only two times because of the severe drought during vegetation. Yield data were analysed and interpreted through variance analysis.

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3. Results and discussion

The foliar structure of the plants is well adapted to water vapour control, to gas control and to nutrient restriction, favouring the adaptation to unfavourable environmental conditions.

Absorption of nutrients from foliar fertilisers is done through cell organelle in the foliar epidermis structure: cuticle, cuticle flaws, stomata, trachoma, and lenticels [1].

Table 1. Impact of time of foliar fertilisation on dry matter yield in alfalfa

Variant of application	2014		2015	
	t/ha	difference t/ha	t/ha	difference t/ha
A week after mowing	5.61	control	3.52	control
Two weeks after mowing	7.68	2.07***	4.91	1.39***

($p \leq 0.05^*$; $p \leq 0.01^{**}$; $p \leq 0.001^{***}$)

In alfalfa, as in other perennial fodder species that need to be mowed several times during vegetation, the use of foliar fertilisers can be an important technological measure for both increased yield and better fodder quality.

The efficiency of using foliar fertilisers depends on the stage of development in plants and on environmental conditions at the time of application. Nutrient absorption capacity depends on the foliar area. As far as alfalfa is concerned,

studies show that the optimal time of application is two weeks after mowing when plants are 10-12 cm high. Thus, compared to the control where foliar fertilisers were applied one week after mowing, when applying the treatment two weeks after mowing yield increases were 2.07 t/ha dry matter more in 2014 and 1.39 t/ha dry matter in 2015 (Table 1).

Table 2. Effect of foliar fertilisers and of time of fertiliser application on dry matter yield in alfalfa (2014)

Time	Treatment	Dry Matter		Difference t/ha	Significance
		t/ha	%		
a1 – One week after mowing	b1 – Control (no fertilisation)	4.54	100	control	
	b2 – Nitrolime	4.99	109.9	0.45	***
	b3 – Cropmax	5.57	122.7	1.03	***
	b4– Nitrolime+ Cropmax	5.67	124.9	1.13	***
	b5– Agroleaf Power	6.32	139.2	1.78	***
	b6– Cropmax+ Agroleaf Power	6,57	144.7	2.03	***
a2 –Two weeks after mowing	b1 – Control (no fertilisation)	5.07	100	control	
	b2 – Nitrolime	6.18	121.9	1.11	***
	b3 – Cropmax	6.99	137.9	1.92	***
	b4– Nitrolime+ Cropmax	8.44	166.5	3.37	***
	b5– Agroleaf Power	9.45	186.4	4.38	***
	b6– Cropmax+ Agroleaf Power	9.98	196.8	4.91	***

DL 5% = 0.18 t/ha; DL 1% = 0.24 t/ha; DL 0.1% = 0.33 t/ha

In the first production year (2014), the effect of the treatments with foliar fertilisers on alfalfa was considerable also due to the more favourable

climate conditions that asked for triple mowing. When applying treatments one week after mowing, dry matter yield ranged between 4.54

and 6.57 t/ha (with increases in yield compared to the control variant ranging between 9.9 and 44.7%); when applying treatments two weeks after mowing, yield levels ranged between 5.07 and 9.98 t/ha dry matter (with increases in yield compared to the control variant ranging between 21.9 and 96.8%). No matter the time of treatment application, the variants treated with Agroleaf or with the combination Cropmax+Agroleaf resulted in the highest yields compared to both the control variant and the other treatments (Table 2).

Results of the second production year (2015), though representing only 50% of the production in

2014 because of the prolonged drought during vegetation show close differences between variants. Thus, maximum efficiency of treatments was when applying foliar fertilisers two weeks after mowing; the two foliar fertilisers (Cropmax and Agroleaf Power) applied single or in combination resulted in higher yields compared to both the control variant and the variant fertilised with Nitrocalcar. Associating the two foliar fertilisers resulted in yield increases 21.6% higher when applied one week after mowing and 67.2% higher when applied two weeks after mowing (Table 3).

Table 3. Effect of foliar fertilisers and of time of fertiliser application on dry matter yield in alfalfa (2015)

Time	Treatment	Dry Matter		Difference t/ha	Significance
		t/ha	%		
a1 – One week after mowing	b1 – Control (no fertilisation)	3.15	100	control	
	b2 – Nitrolime	3.23	102.5	0.08	
	b3 – Cropmax	3.55	112.7	0.4	**
	b4– Nitrolime+ Cropmax	3.69	117.1	0.54	***
	b5– Agroleaf Power	3.66	116.2	0.51	***
	b6– Cropmax+ Agroleaf Power	3.83	121.6	0.68	***
a2 –Two weeks after mowing	b1 – Control (no fertilisation)	3.54	100	control	
	b2 – Nitrolime	4.3	121.5	0.76	***
	b3 – Cropmax	4.46	126.0	0.92	***
	b4– Nitrolime+ Cropmax	5.4	152.5	1.86	***
	b5– Agroleaf Power	5.83	164,7	2.29	***
	b6– Cropmax+ Agroleaf Power	5.92	167,2	2.38	***

DL 5% = 0.23 t/ha; DL 1% = 0.32 t/ha; DL 0.1% = 0.43 t/ha

4. Conclusions

Using foliar fertilisers on alfalfa results in significant increases in yield compared to the control variant and to the variant fertilised with Nitrocalcar.

Applying foliar fertilisers two weeks after mowing resulted in an average increase of the dry matter yield of 40% compared to the variant in which we applied treatments one week after mowing alfalfa.

5. References

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