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Research Article

DETERMINATION OF THE EFFECTS OF HUMIC ACID AND NITROGEN FERTILIZERS APPLICATIONS FOR RANGELAND IMPROVEMENT UNDER MILD HUMID CONDITIONS OF HAYMANA ANKARA

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ABSTRACT. This study was carried out at the Haymana location of Ankara lying under temperate humid conditions for 2 years 2015 and 2016. The study checked the effects of treating 0, 4, and 8 kg/da N and 0 (control), 500, 1000 and 2000 g/ha humic acid on pasture improvement. In terms of botanical composition and improvement of soil cover, significant and positive developments and improvements were determined in the development of legume, Poaceae, and other pasture plants growing under natural conditions using 2000 g/ha humic acid compared to the control treatments.

Keywords: *fertilization, organic acids, weeds, yield, forage plants*

INTRODUCTION

Meadows and pastures are one of the most important and inexpensive natural feed sources used to meet a country's quality roughage gap. They represent natural vegetation that fulfills many ecological functions, as well as meet the roughage needs of domestic animals. The low fodder productivity makes it difficult for optimal livestock production in Central Anatolia. This problem can be solved by the improvement of rangelands. High impact on the production of forage can be done by protecting the available plants growing under natural conditions through rangeland management using locally available living plants and underground water resources by determining their best use. Examples of these functions are the conservation and sustainable use of natural resources required for wildlife, and the creation & preservation of genetic diversity. Meadows and pastures occupy a considerable place in animal nutrition and honeybee raising in many countries of the world [1].

Meadows produce the most quality and abundant quality forage in the cheapest way. Our natural pastures, which have been despised for many years and grazed far above the capacity without paying attention to pasture management need attention. Unfortunately, most of them are damaged and fail to provide the expected yield and quality forage [2].

There is a need to adapt the most correct practices to conserve them and these practices differ from place to place to improve forage that ensures their production, and in the provision of animal feeds. There are many methods in pasture improvement, one of which is fertilization. This method emphasises increase in the yield in terms of quality, and flavor of the feed for improved meat, milk, and their products. Meadows and pastures occupy a considerably important place in animal nutrition and honeybee raising in many countries of the world [1]. Examples of these functions are the conservation and

sustainable use of natural resources required for wildlife, the creation, and the preservation of genetic diversity.

This research studied the impact of naturally grown legume plants on the growth and development of other local flora growing in the same environment using different concentrations of N as Ammonium nitrate in main plots and humic acid in the sub plots to check their effects individually and their interactions on the growth of the local flora. It was assumed that this method may increase leguminous plants and their use in fodder productivity and may help in improving the soil fertility to 2-3 folds with little output.

The study was designed in light of this information and made use of nitrogen fertilizer in the presence of humic acids the use of humic acid, is known to have positive effects on soil health and nutrient use, feed yield, and quality of natural pastures.

MATERIALS AND METHODS

The research was carried out in a natural pasture area located in the vicinity of Günalan Mahallesi of Ankara's Gölbaşı district in 2015 and 2016. The study was set up in 3 replicates according to the test plots divided randomly. In the study, 3 different doses of nitrogen (ammonium nitrate 26% N) fertilizer and 4 different doses of humic acid were applied in the main and sub plots respectively. The main blocks and the plots were separated from each other to minimize the treatment effects. Soil pH value, nitrogen, EC value, lime, organic matter amount, and soil texture were examined from both parts of the area before application in both years. The herbarium samples were taken at regular intervals of one week to identify them in the pasture area around the test plots.

When the dominant species in the pasture reached grazing maturity, their presence in the area was determined in a 1×1 m randomly selected quadrat area in each plot after cutting them from the soil surface and separated according to their families, and the presence of plants belonging to each family was determined by counting, weighing and calculating the percentages of plants belonging to each family [3]. This paper presents information about the leguminous plants that were randomly collected in these 1 m² quadrats. The green herbs were weighed immediately after harvest. Thereafter, these were dried at 70 °C for 48 hours. After, weed legume yield was calculated, and the proportion of the families in the herbal composition was calculated by calculating the share of the dried legumes from the decare in proportion to the ratio of the families in the mixture [4].

Statistical analysis

SPSS 26 statistical software for Windows was used for statistical analysis by comparing means for one-way ANOVA.

RESULTS AND DİSCUSSİON

Significant (p<0.01) differences were noted in the growth pattern of the legumes in the groups of pastures after the application of Nitrogenous fertilizers and different doses of humic acid during two years of the experiment (2015 and 2016). Analysis of variance results confirmed the growth pattern of the legume percentages and growth pattern in the

pastures. The average values obtained in two years for legume percentages are given in Table 1.

Table 1. *Effects of N fertilizers and humic acid concentrations on average proportion of legumes in the botanical composition of natural pastures in the natural flora*

Nitrogen dose (kg/da)	2015					2016				
	Humic acid concentration (g/da)					Humic acid concentration (g/da)				
	0	500	1000	2000	Means	0	500	1000	2000	Means
0	14.537a	7.777c	17.073a	10.677a	12.516aA	5.167^{ns}	0.710	0.000	5.200	2.769^{ns}
4	8.947c	16.423a	14.090b	8.190b	11.913a	5.680	0.070	4.113	3.917	3.445
8	10.603b	13.323b	5.600c	6.777c	9.076b	4.350	1.387	4.367	3.950	3.513
Means	11.362A ***	12.508A	12.254A	8.548B	11.168	5.066	0.722	2.827	4.356	3.242

**All values showed in a single column shown by different letters are significantly different using Duncans multiple range test (p<0.01).
*** All values showed in a single row shown by different letters are significantly different using Duncans multiple range test (p<0.01) ns All values showed in a single column with ns non significantly different using Duncans multiple range test.

If we compare the means of 2015 and 2016, the maximum proportion (17.073%) of legumes in the botanical composition of natural pastures during 2015 was noted using 1000 g/da humic acid per plot without using N fertilizers, while the minimum composition of legume percentage (1.387%) in the botanical composition was observed using 8 kg/da N nitrogen fertilizer +500 g/da humic acid during 2016.

No humic acid application using different concentrations of N

An irregular increase in the legume composition of natural pastures (in the range of 10.603-14.537%) was noted, in the absence of humic acid during 2015. Stable growth (in the range of 4.350-5.167%) and non-significant differences were noted in the botanical composition of legumes in natural pastures under the same conditions in 2016.

500 g/da humic acid application using different concentrations of N

During 2015, the increase in the botanical composition of natural pastures was irregular with a maximum of 16.423% using 4 kg/da N. Whereas, during 2016, the proportion of legumes in the botanical composition of natural pastures was statistically non-significant using 500 g/da humic acid with or without N. This proportion increased to 1.387% using 8 kg/da N.

1000 g/da humic acid application using different concentrations of N

A maximum proportion (17.073%) of legumes was noted in the botanical composition of natural pastures using 1000 g/da humic acid without N. No proportion of legumes was noted in the botanical composition of natural pastures using 1000 g/da humic acid during 2016. Each increase in the concentration of N ended up in a decrease of legumes in the botanical composition of natural pastures using 1000 g/da humic acid during 2015. Whereas the statistically similar proportion of legumes was noted in the botanical composition of natural pastures in the range of 4.113 - 4.367% using 4 and 8 kg/da N during 2016.

2000 g/da humic acid application using different concentrations of N

No N application showed maximum proportion of legumes in the botanical composition of natural pastures using 2000 g/da humic acid concentration. Using 4 and 8 g/da N with 2000 g/da humic acid ended up in a gradual decrease in the botanical composition of natural pastures, whereas the botanical composition of legumes in the natural pastures at these two concentrations of N was non significantly different during 2016.

The results we obtained are in agreement with Gökkuş [5], Altın ve Tuna [6], Tükel and Hatipoglu [7], Koç et al. [8], with Çomaklı et al. [9] are similar to the work. The researchers emphasize that they saw a decrease in the rate of legume plants due to increasing doses of nitrogen.

It is observed that other families decreased due to increasing nitrogen fertilizer and humic acid doses in 2015, and other families decreased due to nitrogen fertilizer increase in 2016, but this change was more irregular with the increase in humic acid.

Results obtained in 2015 by Çomaklı et al. [9] and Altın et al. [10] are similar to the results obtained in the current study. Altın et al. [10] suggested in their research that they applied nitrogen and phosphorus fertilizers using natural pasture cuttings, the proportion of wheat grass and legume plants increased and the rate of plants from other families decreased. Gökkuş [5] suggested that nitrogen fertilization does not cause a significant change in plants from other families.

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