

# 야생 알팔파의 건물수량, 생육특성 및 사료적인 가치

신정남

## Dry Matter Yield, Growth Characteristics and Nutritive Value of Wild alfalfa

C. N. Shin

### 摘 要

우리나라에는 알팔파의 야생종이 자생하고 있으나 이에 관해 조사 연구되어 발표된 결과는 거의 없다. 그러므로 대구지역에 자생하는 알팔파의 생육특성, 건물수량 및 사료가치 분석을 통하여 목초화 가능성을 밝히고자 하는 것이 본 시험의 목적이다.

야생 알팔파와 'Vernal' 품종을 1995년 봄에 경북 경산의 계명문화대학 사료작물포장에 파종하였다. 출현율은 'Vernal'이 야생 알팔파보다 우수하였으며 개화기는 야생 알팔파가 8일 늦었다. 재생력은 'Vernal'이 야생 알팔파보다 우수하였으며 마지막 예취 (9월 22일) 이후 야생 알팔파는 거의 재생되지 않았으나 'Vernal'은 재생력이 우수하였다. 잡초율은 야생 알팔파가 'Vernal'보다 높았으며, 건물수량은 'Vernal'이 야생 알팔파보다 유의하게 ( $P < 0.05$ ) 높았다. 조단백질, ADF 및 NDF 함량은 1 및 2차 예취 때는 품종간에 차이가 없었으나 3차 예취시는 조단백질 함량은 야생 알팔파가 약간 높은 경향이였으며 ADF와 NDF 함량은 낮은 경향을 보였다.

### I. INTRODUCTION

One of the great limitations of Korean forage production is the lack of a proper forage species adapted to Korean climate and environmental conditions. Most of our best forage crops were introduced from foreign countries. Korean lespedeza was introduced to the U.S. in 1919. Most of the annual lespedeza seed now produced in the U.S. were from Korean cultivars. Annual lespedezas were used widely for pasture and soil conservation (Hoveland and Donnelly, 1985).

All species in the genus *Medicago* are called 'Moksuk' in Korean. Moksuk has been cultivated as a vegetable and for forage since the Yi Dynasty more

than 100 years ago (Kim, 1983). However there are no available research results indicating if it was an important forage crop. Yoon (1995) and Kim et al. (1988) reported that wild alfalfa (*Medicago sativa* L.) grows in Korea, but specific information is lacking as to its growth characteristics, nutritive value and dry matter production potential. At this point, it is necessary to evaluate wild alfalfa.

Legume winter cover crop hairy vetch (*Vicia villosa* Roth) can supply mineral nitrogen for silage corn and decrease soil erosion (Seo and Lee, 1998). Interest in the use of forage legumes in crop rotations has been revived because of the need to reduce nitrogen fertilizer usage and because of increased concern about soil erosion and water quality (Heichel and Barnes,

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계명문화대학 동물산업과 (Dept. Ani. Prod., Keimyung College, Daegu 705-037, Korea)

1984; Papendick and Elliott, 1984).

The objective of this study was to evaluate the usefulness of wild alfalfa as a forage. Specific objectives were: ① to evaluate the growth characteristics, adaptation to climate, and disease resistance; ② to determine dry matter yield; and ③ to compare the nutritive value of wild alfalfa and Vernal.

## II. MATERIALS AND METHODS

The experiment was carried out in 1995, at Keongsan, Keongbuk. A randomized complete block design was used, with cultivars as treatments. There were four replications and each plot size was 6m<sup>2</sup>(1.5 × 4m).

Vernal, one of the recommended cultivars of alfalfa (*Medicago sativa* L.) in Korea was sown March 28 along with wild alfalfa. The seeding rate was 20kg per hectare. Nitrogen, in the form of urea, was applied at seeding time at the rate of 50 kg/ha. Phosphorus and potassium also were applied at the rate of 200 and 100 kg/ha, respectively. Additional potassium was applied at the rate of 35 kg/ha after each cut.

Germination test conditions were as follows; Seeds were germinated on moistened filter paper in covered Petri-dishes at 20°C incubation. Evaluations of emergence, regrowth, weed and disease resistance were made visually by scoring from 1-9, 1 being the poor and 9 the outstanding. Plant heights were measured at the first cutting.

Dry matter content of forage samples was determined by oven drying at 85°C for 48 hours. Samples for chemical analysis were oven dried at 65°C

for 24 hours. Samples were ground so as to be able to pass through a 1mm screen in the Wiley Mill. Nitrogen content was determined by Kjeldahl analysis (AOAC, 1980). Neutral detergent fiber(NDF) and acid detergent fiber(ADF) were measured by the Goering and Van Soest method(1970).

To investigate dry matter yield, wild alfalfa was cut on June 28(1st), August 3(2nd), and September 22(3rd) and Vernal was cut June 22(1st), July 27(2nd), and September 22(3rd).

## III. RESULTS AND DISCUSSION

### 1. Growth characteristics

A summary of the growth characteristics appears in Table 1. Wild alfalfa seeds had a germination rate of 63% in the germination test and emergence for Vernal was better than for wild alfalfa. The first flowering dates, in the first cutting, were June 8 and June 17 for Vernal and wild alfalfa, respectively. Fifty percent flowering was observed June 19 for Vernal and June 27 for wild alfalfa. Vernal flowered 8 days earlier than wild alfalfa. The wild alfalfa flowers, had petals which were various shades of purple. Those of Vernal were also mainly purple, but there were quite a few yellows and some whites. The semi-spreading stems of the wild alfalfa reached a height of 69cm and the erect stems of the Vernal were 73cm in height at the first cut. As alfalfa matures, apical dominance is broken and new stems elongate from buds at crowns or stem bases(Fick 1977), however new stems of the wild alfalfa elongate from buds at stem bases. Regrowth for

Table 1. Growth characteristics of wild alfalfa and Vernal

Cultivars	Emergence	Flowering date	Plant height	Regrowth	Weed	Disease resistance
	... 1-9* ...		... cm ...	.....	1-9* .....	
Wild alfalfa	7	June, 27	69	5	6	9
Vernal	9	June, 19	73	9	8	9

\* Rating; 9 = outstanding, 1 = poor.



wild alfalfa was poor and it was not as good as that of Vernal. After cutting in the fall, Vernal had moderately vigorous growth of about 37cm high before the first killing frost. Weed infestation of the wild alfalfa plots was higher than for Vernal plots, because there was poor regrowth of the wild alfalfa after harvesting. After the last cutting in the fall(September 22), wild alfalfa become dormant. In response to cool weather and short daylengths in the fall, winter-hardy cultivars become dormant. The dormancy reaction involves complex physiological changes by the plant in preparation for winter and results in decreased herbage growth and increased carbohydrate storage(Jung and Larson, 1972). Sheaffer et al.(1988) reported that nondormant alfalfas have a longer growth duration and greater fall herbage growth than adapted dormant cultivars, but those alfalfas do not overwinter in the North Central State.

## 2. Dry matter yield

A summary of the dry matter yield appears in Table 2. The dry matter yields per hectare were

significantly( $P < 0.05$ ) higher with Vernal than with wild alfalfa. Vernal produced 7.5% more dry matter yield than wild alfalfa. The dry matter yields of the wild alfalfa per hectare decreased more than Vernal with advancing cutting frequency. The dry matter yields were 12,409 kg/ha for wild alfalfa and 13,343 kg/ha for Vernal. Wild alfalfa did not recover rapidly after cutting in comparison to Vernal. That was one of the reasons why its yield was lower than Vernal. Forage dry matter yields were affected significantly by testers using cultivars(Kim, 1987). The average yields are frequently doubled by producers using improved cultivars and improved soil and crop management practices(Barnes and Sheaffer, 1995).

## 3. Nutritive value

Crude protein(CP), NDF and ADF contents are shown in Table 3. They were not different in the 1st and 2nd cuttings. However the CP content was slightly higher in the wild alfalfa in comparison with Vernal and NDF and ADF contents were lower in the 3rd cut. The CP, NDF, and ADF contents were 22.0, 47.1, and

Table 2. Dry matter yield of wild alfalfa and Vernal

Cultivars	Dry matter yield			
	1st cut	2nd cut	3rd cut	Total
	..... kg/ha .....			
Wild alfalfa	6,130	4,729	1,550	12,409
Vernal	5,266	5,159	2,918	13,343
Mean	5,698	4,944	2,234	12,876
LSD(0.05)				721

Table 3. Crude protein(CP), neutral detergent fiber(NDF) and acid detergent fiber(ADF) content of the wild alfalfa and Vernal

Harvest	Wild alfalfa			Vernal		
	CP	NDF	ADF	CP	NDF	ADF
	..... % , DM basis .....					
1st cut	20.0	50.9	33.7	20.9	50.0	33.6
2nd cut	20.1	49.4	33.0	20.2	51.0	35.0
3rd cut	22.0	47.1	29.2	18.8	53.8	36.0

29.2% for wild alfalfa and 18.8, 53.8, and 36.0% for Vernal, respectively.

#### IV. SUMMARY

Alfalfa grows wild in some parts of Korea, but specific information is lacking as to its growth characteristics, nutritive value and dry matter yield. The objective of this study was to evaluate the usefulness of wild alfalfa (*Medicago sativa* L.) as a forage. Wild alfalfa and 'Vernal' were field sown at Keongsan, Keongbuk in the spring of 1995. Emergence for 'Vernal' was better than for wild alfalfa. It was observed that the flowering date of the wild alfalfa was delayed by 8 days. Regrowth of 'Vernal' was better than that of the wild alfalfa at each harvesting. After the last harvesting date, September 22, there was poor regrowth of the wild alfalfa, but regrowth of 'Vernal' was moderately vigorous growth. Weed infestation in the wild alfalfa plots was higher than in the 'Vernal' plots. The dry matter yields per hectare were significantly ( $P < 0.05$ ) higher for 'Vernal' than for the wild alfalfa. The CP content was slightly higher in the wild alfalfa in comparison to 'Vernal'. NDF and ADF contents were lower in the third cut, but they were not different in the 1st and 2nd cuttings.

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