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THE EFFECT OF GROWTH STAGE (PHASES OF GROWTH) ON THE QUALITY OF ALFALFA FORAGE

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***Annotation.** The article briefly discusses the nutritive values of alfalfa in different stages of growth which determines the quality of the plant. The best harvesting time of alfalfa forage for higher quality of feeding animals is presented.*

***Key words**: alfalfa, nutritive value, crude protein (CP), neutral detergent fibre (NDF), acid detergent fibre (ADF), stages of growth.*

Alfalfa (Latin. *Medicágo*) is one of the most important crops due to the high yields produced and its extraordinary chemical composition and it is one of the

major forage for feeding ruminants because of its high protein content [2;4]. The quality of alfalfa depends on several factors, such as the stage of growth at harvesting time. Harvesting time is considered as the main factor which influences the chemical composition of alfalfa. The leaf/stem ratio determines the content of the plant and it is greatly influenced by harvesting time [4]. Alfalfa plants have different phases of growth: vegetative, budding, and flowering phase. In general, several researchers have reported that with advancing stages of crop maturity the main features observed in forage harvesting are the increase of dry matter (DM), fiber contents, neutral detergent fiber (NDF), and acid detergent fibre (ADF), and the decrease of crude protein (CP) content [1]. According to Rufino-Moya *et.al* [3] the alfalfa plant components has shown a decrease of leaves content by 28 % and an increase of stems content by 26 % from vegetative to the end of flowering stage which is negatively affects the quality of the plant (Table 1).

Table 1

Chemical composition and plant components of alfalfa at three stages of maturity in the year of 2015 [3]

Plant components	**Vegetative**	**Early flowering**	**Full flowering**
Leaves (%)	59.3	53.7	42.7
Stems (%)	40.7	43.7	51.3
Flowers(%)	0.0	2.5	5.9

According to Guo *et al.* [2], a significant difference was observed in the contents of CP, NDF and ADF at the three different phases of growth. There was a decrease of protein and increase of fiber contents with advancing maturity of alfalfa. The chemical composition of alfalfa in the first cut has shown a decrease of CP by 13.2 % and an increase of NDF and ADF by 22.1, 20.2 % respectively from budding to full flowering stage, and similarly in the second cut has also observed an increase in NDF (8.9%) and ADF (8.8%) (Table 2).

Table 2

Alfalfa chemical composition of first and second cut harvested at three stages of growth in the years of 2016 and 2017 [2]

Item	% Dry matter		
	CP	NDF	ADF
First cut			
Budding Stage	20.4	32.2	22.8
Initial flowering stage	18.9	36.8	25.9
Full flowering stage	17.7	39.3	27.4
Second cut			
Budding Stage	17.7	38.2	28.4
Initial flowering stage	18.5	39.8	28.5
Full flowering stage	17.8	41.6	30.9
P value			
Growth stage	**	**	**

** high significance at $P \leq 0.01$

A study carried out in Romania between 2011 and 2013 has confirmed that the Neutral detergent fibre (NDF) and Acid detergent fibre (ADF) contents of the alfalfa plant has increased with increasing stages of growth but the crude protein content has continued to decrease as shown in the figure below [4].

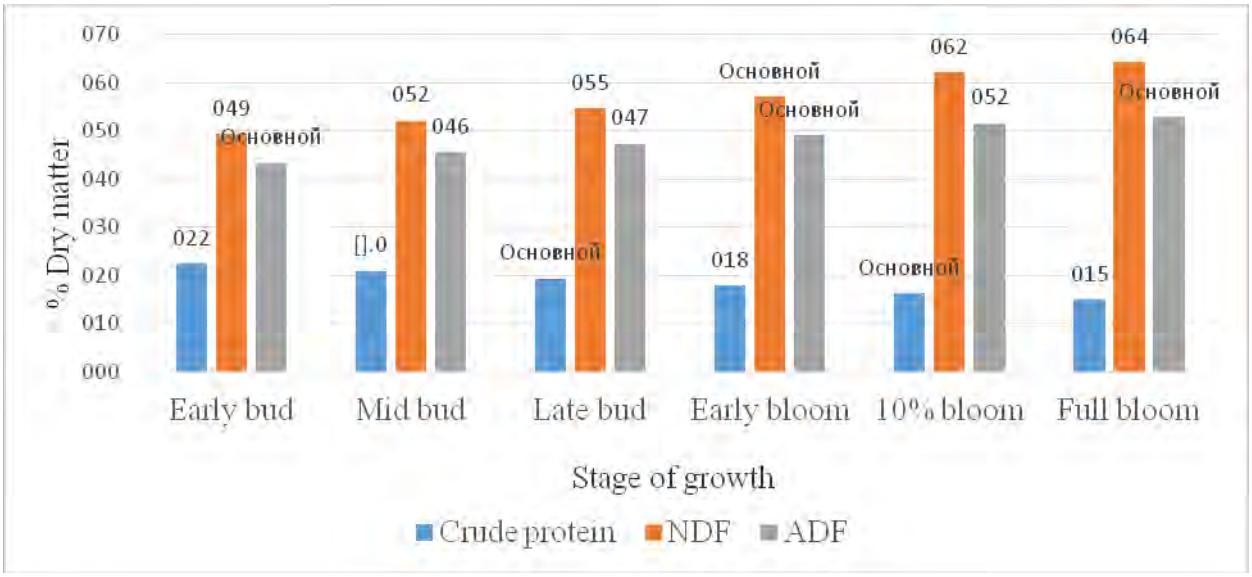

Figure 1 - **The average value of alfalfa quality parameters in the different stages of growth (Year, 2011-2013) [4]**

Fan et al. [1] observed a higher leaf yield than stem yield of alfalfa harvested at the budding stage. Alfalfa leaves consists of low protein content in the flowering stage because of a decrease in L-glutamic acid content (aminoacid), and there is also an increase in the NDF content and lignin synthesis due to a higher hemicellulose and L-phenylalanine content in the leaves which reduces the relative feed value and quality of alfalfa [1].

Generally, alfalfa is very rich in nutritive value which are very important as ruminant's diet. It is higher in dry matter, protein, and minerals than many other forages. However, as shown above in the article, different studies have shown that the alfalfa quality can be affected by stages of growth. The leaf stem ratio was observed as a key factor in determining the nutritive value of alfalfa. The quality of alfalfa decreases as advancing of maturity with the decrease of protein content and increase of fibre content (more lignin content) which lowers digestibility of the feed. Therefore, it can be recommended that harvesting them at the budding phases of growth has a maximum benefit for feeding animals.

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КОНСЕРВИРОВАНИЕ ЛЮЦЕРНЫ В КАЧЕСТВЕ СИЛОСА И ВЛИЯНИЕ КОНСЕРВАНТОВ

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***Аннотация**. В статье кратко излагается важность консервирования люцерны и его сохранения в качестве силоса, а также механизмы, используемые в процессе консервирования. Представлены факторы, влияющие на процесс консервирования и значимость использования таких консервант, как бактериальные инокулянты и химические вещества в процессе консервирования для получения высококачественных кормов. Объясняется влияние желательных и нежелательных микроорганизмов на процесс консервирования.*

***Ключевые слова**: Люцерна, консервация, силос, консервант, микроорганизмы, бактериальные инокулянты, молочная кислота.*

Люцерна широко используется в качестве корма для животных из-за его высокого содержания сырого белка, но она требует эффективного метода консервирования, который должен непрерывно использоваться скотом в течение всего года, поскольку она собирается сезонно. Наилучшей техникой для животноводства является использование методов управления кормами для обеспечения грубыми кормами животных в критические периоды производства, а сено, сенаж и силос являются ключевыми методами сохранения, и эти методы требуют сохранения уникальных и сложных характеристик. Методы консервации кормов обеспечивают животных кормом в критические периоды производства, а основные методы консервации включают сено, сенаж и силос, и они требуют сохранения уникальных и специфических характеристик. Силос - это анаэробный способ