



**Watch Canola Nitrate Closely before Grazing**

**Hailin Zhang, Tom Peeper and Mark Boyles**  
**Department of Plant and Soil Sciences**  
**Glenn Selk**  
**Department of Animal Science**

Nitrate is one of the major nitrogen forms utilized by plants. Excessive nitrate accumulation can occur when the uptake of nitrate exceeds its utilization in plants for protein synthesis due to factors such as over nitrogen fertilization and stressful weather conditions. It can be toxic to livestock when too much nitrate is accumulated in the forage crops. Sorghum and millet have been noted as having a high potential for accumulating nitrate. However, winter canola sampled during the fall of 2004 has also been found containing high nitrate. Producers should watch their forage nitrate closely to avoid cattle fatalities. Normally, drought stress, cold and cloudy weather and other climatic conditions will increase nitrate accumulation in the plant.

Table 1 is a summary of our laboratory nitrate test results for major warm and cool season forage crops. Although we have less experience with canola, some canola sampled this fall had higher nitrate than typically seen in other forage crops. However, the interpretation of canola nitrate could be different from other forages since fresh canola leaves contain almost 85% water, which is significantly higher than other forages. Most nitrates in Canola are accumulated in the leaf petiole (Table 2). This is similar to the fact that more nitrates are found in the stem of sorghum-sudan and pearl-millet. Note that the range, or differences among samples from different sources, is very large. Data to date do not indicate variety differences in nitrate accumulation.

**Table 1. Nitrate in winter canola in December 2004 compared with levels often found in other forages.**

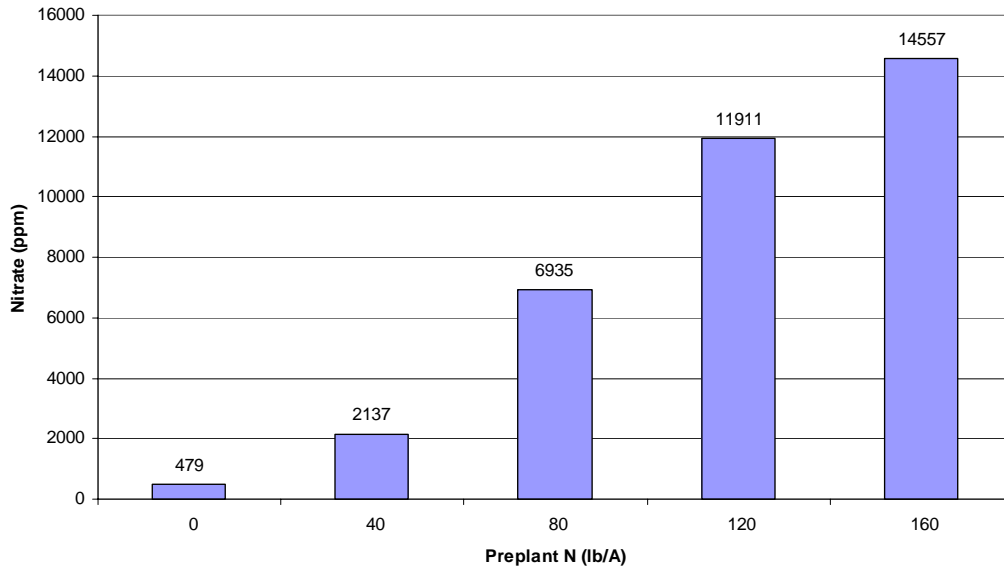
Forage Crop	Mean NO <sub>3</sub> (ppm) (dry matter basis)	Range NO <sub>3</sub> (ppm)	Moisture Content
Canola	23,790	148-46018	85%
Winter wheat	2896	437-7948	11%
Pearl Millet	10,322	940-32,000	9%
Sorghum Sudan	7,800	300-34,000	11%

**Table 2. Nitrate partitioning between winter canola leaf blades and petiole of samples collected from a producer's field in December 2004.**

Plant Parts	Whole Leave	Leaf Blades	Petiole (Stem)
Nitrate (ppm)	11,800	1,980	25,300

When nitrate in forage exceeds 10,000 ppm it is considered potentially toxic to cattle. Producers should avoid grazing or feeding with high nitrate hays. More detailed interpretation can be found in OSU Extension Fact 2903 *Nitrate Toxicity in Livestock*. The most reliable way to determine nitrate in hay or forage is to collect a representative sample and have it tested by a laboratory. OSU Extension Fact 2589 *Collecting*

**Forage Samples for Analysis** highlights the proper techniques for collecting forage samples. Samples can be submitted for nitrate and other forage quality analyses to the Soil, Water and Forage Analytical Laboratory in Stillwater through any OSU County Extension Office. We normally have the results ready within 24 hours from the time a sample is received by the lab. However, many samples we receive at the lab were not sampled properly. More attention should be paid to sampling standing forage, such as canola by following the right procedures. Clip at least 20 representative whole leaves (only one leaf from each plant randomly selected) from the suspected area. Cut the leaves into 5 to 6 inch long pieces, and fill a sample bag (available from OSU Co. Extn. Office) with the pieces. Put the forage bag into a plastic bag to preserve moisture. Do not put the plastic bag inside the forage sample bag, because it will be damaged by drying. Take the sample or ship it overnight to the lab.



**Figure 1. Relationship between canola leaf nitrate concentration and pre-plant nitrogen application. Sampled December 16, 2004 from Canola Fertility Trial, Northcentral Research Station, Lahoma.**

Canola leaf blades have much lower nitrate than that in the petiole. Nitrate concentration decreases from the bottom up. Data to date suggest that potential nitrate toxicity due to grazing canola may be manageable by limiting fall nitrogen applications to the recommended 1/3 of the amount required for the crop, removing cattle before they begin eating the leaf petioles, and/or by carefully monitoring cattle grazing canola during cloudy weather. Remember that canola forage should be treated as a concentrate, not a roughage, and free choice low quality dry roughage provided to cattle grazing canola.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, sex, age, religion, disability or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1913, in cooperation with the US Department of Agriculture, Sam E. Curl, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources.