NITRATE ACCUMULATION IN SOME FORAGE CROPS

BY

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B. Sc. Agric. Sci. (Soil Science), Fac. Agric., Cairo Univ., Egypt, 2008

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APPROVAL SHEET

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ABSTRACT

Field experiment was carried out at the Experimental Station Farm in Giza, Agricultural Research Center, Egypt, during the two successive summer seasons of 2012 and 2013 to study the effect of varying sources and rates of nitrogen fertilizers on fresh and dry forage yield of sudangrass, chemical constituents, nitrate and nitrite accumulation in plant. The experiment was carried out in a split-plot design with three replications. The main plots were assigned to nitrogen fertilizers sources (Ammonium nitrate "$NH_4 NO_3$" 33.5 % N and ammonium sulphate "$(NH_4)_2 SO_4$" 20.6 % N). While, the sup-plots were occupied with rates of nitrogen fertilizer (50, 75, 100 and 125 kg N/fed). The results indicated that fresh and dry forage yield, nitrogen, crude protein, phosphorus, potassium, nitrite and nitrate contents were significantly decreases in the second cutting as compared with the first cutting over both seasons. Using ammonium sulphate "$(NH_4)_2 SO_4$" as a source of nitrogen was better than using of ammonium nitrate "$NH_4 NO_3$" as a source of nitrogen over both cuttings and seasons. Fresh and dry forage yields of sudangrass were significantly increased as nitrogen rates were increased from 50 to 75 and 100 kg N/fed, and significantly decreased due to increasing nitrogen rate from 100 to 125 kg N/fed over both seasons. By increasing nitrogen fertilizer rates, nitrogen, crude protein, phosphorus, potassium, nitrite and nitrate contents in sudangrass plants were significantly increased in the first and the second cuttings as combined over both seasons. It can be recommended that mineral fertilizing sudangrass plants with 100 kg N/fed as ammonium sulphate in order to maximize its forage yields and reduce nitrate and nitrite accumulation in plant under the environmental conditions of Giza Governorate, Egypt.

Biological experiment was carried out to investigate the effect of different levels of nitrate in Rex male rabbit diets. Forty Rex male rabbits with average body weight 700 ± 10 g were randomly assigned to 4 groups (10 animals in each). The 1st group rabbits were fed commercial basal diet (control). The other groups (2-4) were fed control diet supplemented with 1, 2 and 3% sodium nitrate (equal to 0.73, 1.46 and 2.19% nitrate), respectively. Results of the present study showed that rabbit performance (daily body weight gain, daily feed intake and feed conversion), digestibility of nutrients and nutritive values expressed as TDN % and DCP % as well as hemoglobin concentration and erythrocyte count (RBCs) of rabbits fed diet supplemented with 3% nitrate significantly ($P<0.05$) decreased. On the other hand, methemoglobin values and blood enzymes (aspertate aminotransferase, AST and alanine aminotransferase, ALT) activities and creatinine value increased ($P<0.05$).

Residue of nitrate in organs increased with increasing nitrate level in diet. The total count and differential of white blood cells (% of neutrophil, lymphocyte, monocyte, eosinophil, basophiles), platelets value, mortality rate and organs weight (liver, kidneys, lungs and heart) as % of slaughtered weight did not significantly ($P>0.05$) affected by all levels of nitrate. Histological lesions of kidneys, lungs and liver due to nitrate were found. Generally, the bad effect of nitrate on rabbits increased as a nitrate concentration increased. In conclusion, rabbits under these investigations can tolerate 0.73% nitrate (1% sodium nitrate) in feed without significant negative effect. Most results of 1.46 % nitrate (2% sodium nitrate) and all results of 2.19 % nitrate (3% sodium nitrate) had toxic effect of growth performance, digestibility of nutrients, blood parameters, histological structure of internal organs of rabbits.

Key words: Nitrogen fertilizer, Nitrate Accumulation, Sudangrass

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CONTENT

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