

NITRATE-NITRITE TOXICITY IN SOUTH-WEST REGION OF PUNJAB: A REPORT

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SUMMARY

A study was undertaken to determine the effect of season and type of fodder causing nitrate and nitrite toxicity in cattle population of south-west region of Punjab. Diphenylamine spot test was performed for the screening of the samples. The samples were positive during the month of September to February because drought cloudy or cold weather, excessive rain, frost, moisture affect nitrate contents in plants to a great extent.

Keywords: Nitrate toxicity, Cattle, Diphenylamine, Punjab

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Nitrate-nitrite toxicity can be an important cause of production losses in the cattle industry. It occurs naturally in the environment as a part of nitrogen cycle. During periods of draught, the amount of nitrate in the soil increases due to reduced leaching, reduced nitrogen uptake by plants, and decomposition of organic matter. Consequently, when such a draught breaks by rain, plants resume their growth and uptake of nitrate rise sharply, particularly in the first week after rainfall. Consumption of such draught stricken fodders results in poisoning (Sarah, 2007).

Many species are susceptible to nitrate and nitrite poisoning but most commonly cattle are affected. Nitrate poisoning in cattle is caused by the consumption of an excessive amount of nitrate or nitrite from grazing crops, hay, silage, weeds, drinking water, lubricating oil, fertilizer, etc however consumption of nitrate containing plants (oats, sorghum, maize, rye, wheat, barley) remains the most important source of poisoning in ruminants. In ruminant animals such as cattle, sheep, and goats, nitrate is converted to nitrite by bacteria in the rumen. This nitrite is then changed to ammonia. Excess ammonia is absorbed by the blood and passed in the urine as urea. This normal process occurs when the nitrate breakdown system is in balance and no surplus of nitrites accumulate (Aiello, 2016; Hall, 2018).

The present study was undertaken to determine the effect of season and type of fodder causing nitrate and nitrite toxicity in cattle population of South-west region of Punjab. Study period, type of sample, study area test procedure and differentiation test were taken into consideration.

The study was conducted for a period of two years i.e. from February, 2023 to February, 2025 from the cases

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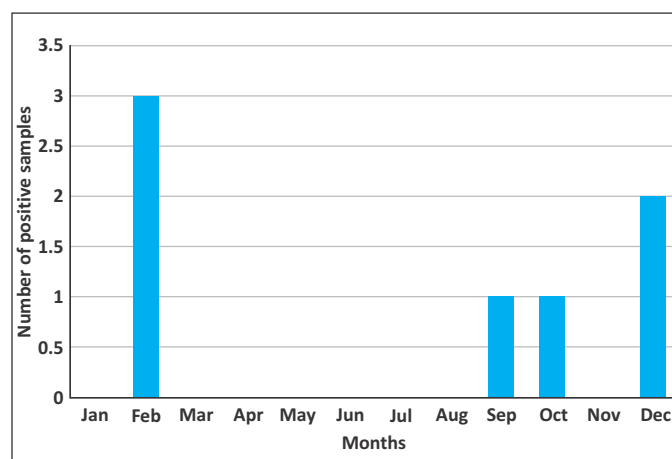


Fig. 1. Number of positive samples during different month of the year

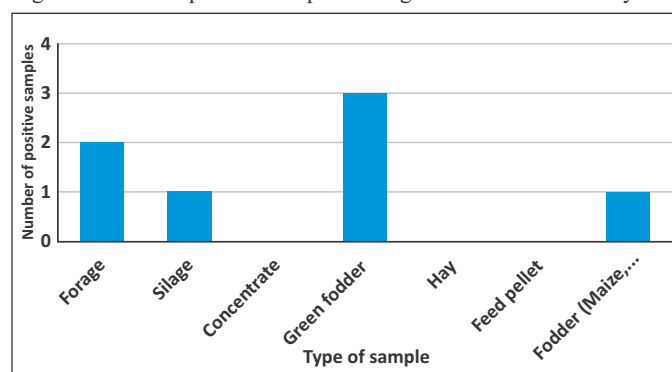


Fig. 2. Different type of sample screened and total number of positive samples

presented to VCC, COVS, Rampura Phul from villages nearby to Rampura Phul, Manasa and Bhatinda. A total of 100 samples were received with a history of diarrhoea and vomiting, salivation, abdominal pain, rapid pulse and dyspnoea or death of animals in the herd. Diphenylamine spot test was performed for the screening of the samples. The positive samples were further confirmed quantitatively by nitration of salicylic acid procedure (Lastra, 2003). The sample were differentiated from cyanide poisoning. The

differentiation test performed for cyanide was sodium picrate paper test as per the standard protocol (Bradbury and Egan, 1992 & 1994).

Out of 100 samples screened, a total of 7 samples were found positive for nitrate-nitrite. The samples were positive during the month of September to February as during this period the climate usually hot, humid and thereafter become cold in south west Punjab (Fig.1). This extreme weather condition is responsible for the nitrate accumulation in the fodders and subsequently contributes to the toxicity in ruminants. 1 sample each of dry fodder (wheat straw, paddy straw, hay etc.) and freshly prepared silage, 3 green fodder (Maize, Sorghum, Berseem etc.) and 2 forage samples (soyabean, grass, rye) were positive for nitrate-nitrite toxicity (Fig. 2).

The screened samples were positive during the month of September to February because drought, cloudy or cold weather, excessive rain, frost, moisture affect nitrate contents in plants to a great extent. Similar findings are reported by Premalatha and Ramya (2016). Further the

fodder, green forages, silages were positive for nitrate-nitrite because the content of nitrate is higher in these samples.

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