

***Salvia coccinea* poisoning among migratory Gaddi goats: Evidences from mid hills of Himachal Pradesh (India)**

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In hilly and mountain areas of north–western Himalayan region of India, the demand of feeds and fodder for livestock is much higher than their availability. In mid hills of Kangra valley under the agro-ecological zone 1.1 of Himachal Pradesh, the grasslands are degraded and are infested with wide variety of wild and poisonous plants like *Salvia coccinea*. Many species of *Salvia* contain toxic level of nitrates (Blood and Radostits 1989). Among animals, ruminants are especially vulnerable to nitrate intoxication because of the nitrate-reducing potential of rumen microorganisms (Aslani and Vojdani 2007). Winter enhances accumulation of nitrates in *Salvia coccinea* due to inhibition of light and warmth dependent nitrate reductase enzyme. Thus consumption of these toxic plant species especially during winter is detrimental to the health of the animals. This communication contemplates to record an outbreak of plant nitrate poisoning owing to *Salvia coccinea* (*Kali phool*) in a flock of 300 migratory Gaddi goats during February in Khundia area of district Kangra, Himachal Pradesh. Out of 300 Gaddi goats, 20% (60/300) died within 48 – 72 h with highest mortality rate among suckling kids (40). Clinical manifestations included a subnormal body temperature (100.2 to 101.8°F), increased pulse rate (115 – 129/min), increased respiration rate (35–37/min), severe ruminal impaction, staggering gait, anorexia and congested conjunctivae reflecting tissue oxygen deprivation and concurred with previous reports of Bahri *et al.* (1997) and Casteel and Evans (2004). The detailed anamnesis revealed that Gaddi goats have browsed on flower bearing plants of *Salvia coccinea* that were abundantly growing in the shady areas of hillock.

The samples of foliage were collected for nitrate estimation as per Cataldo *et al.* (1975). Similarly, the blood samples of severely affected goats were also analyzed for nitrite content as described by Schneider and Yearly (1973)

with slight modifications. The nitrate level higher than 1.5% on dry matter basis in plants is considered toxic for animals (Bondi and Alumot 1987, Bahri *et al.* 1997). However, in the present laboratory examination of whole foliage nitrate content was found to be 12.63% on dry matter basis, which is in excess of maximum permissible limit thus posing detrimental effect on health of goats as reported by Valli (1998). The mean nitrite content in the sera of ailing goats was found to be 6.2 mg%. The hematology of severely affected goats revealed hemoconcentration as evidenced by an average of 48% Packed Cell Volume (PCV) which is in agreement with the findings of Varshneya *et al.* (1995).

On post mortem examination of affected carcass, grossly petechial and ecchymotic hemorrhages were evident on serosal surfaces. Rumen, abomasum and intestines were congested. The detailed microscopic examination of tissue samples revealed the significant changes in liver, kidneys, lungs, intestines and spleen.

There was marked hepatocyte swelling and hyperemia of sinusoid in the liver. Histopathology of kidney showed marked increase in the cellularity of glomerular tuft with an increase in Bowman's space. The tubular epithelium at places appeared separate from basement membrane accompanied with a moderate degree of interstitial congestion in kidneys (Fig.1).

In lungs, thickening of interlobular septae due to accumulation of fibrinous exudate mixed with neutrophils and few mononuclear cells were the only predominant

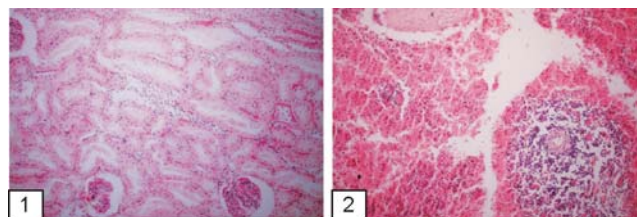


Fig. 1. Kidney tissue showing interstitial congestion and sloughing of tubular epithelial cells. H & E. × 66.

Fig. 2. Marked depletion of lymphocytic cells in the white pulp of spleen. H & E. × 132.

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changes. Mild congestion was observed in the lamina propria of intestine along with submucosal oedema and autolytic changes in villus epithelium. The splenic parenchyma was markedly congested with infiltration of neutrophils besides mononuclear cells suggesting acute nature of disease. Lymphocytic depletion was also evident in the white pulp of spleen (Fig. 2).

Migratory or recently transported stock are more susceptible to nitrite poisoning than others (Radostitis *et al.* 2000). These findings corroborated with present study where the cases were reported among the migratory Gaddi flock. In addition to clinical signs, nitrate toxicosis was also found associated with significant changes in liver, kidneys, lungs, intestines and spleen in ruminants as reported by many workers (Casteel *et al.* 1994, Torres *et al.* 1997) and also observed in the present investigation. Treatment of affected goats with methylene blue (1%), metoclopramide, liver extract and magnesium sulphate resulted in recovery and no further mortality was observed.

SUMMARY

An outbreak of nitrate poisoning due to accidental ingestion of *Salvia coccinea* vernacularly called *Kali phool* by a flock of 300 migratory Gaddi goats with 20% mortality was reported during winter in Kangra Valley, Himachal Pradesh, India. The history, clinical signs, characteristic post mortem findings, presence of excess level of nitrates in the foliage of *Salvia coccinea* plants (12.63% on dry matter basis) and 6.2 mg % of nitrite contents in the sera of ailing goats evidences the nitrate poisoning owing to *Salvia coccinea* (Kali phool) among Gaddi goats.

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