



ISSN: 2456-2912

VET 2024; 9(6): 627-628

© 2024 VET

[www.veterinarypaper.com](http://www.veterinarypaper.com)

Received: 02-10-2024

Accepted: 07-11-2024

**N Sri Balaji**

Assistant Professor,  
Department of Livestock  
Production Management,  
Veterinary College and Research  
Institute, Namakkal, Tamil  
Nadu, India

**S Ramakrishnan**

Veterinary College and Research  
Institute, Namakkal, Tamil  
Nadu, India

**J Muralidharan**

Mecheri Sheep Research Station,  
Pottaneri, Tamil Nadu, India

**D Anandha Prakash Singh**

Veterinary College and Research  
Institute, Namakkal, Tamil  
Nadu, India

**V Sankar**

Mecheri Sheep Research Station,  
Pottaneri, Tamil Nadu, India

**Corresponding Author:**

**N Sri Balaji**

Assistant Professor,  
Department of Livestock  
Production Management,  
Veterinary College and Research  
Institute, Namakkal, Tamil  
Nadu, India

## Evaluation of toxic residues in cotton gin trash used as a roughage supplement by sheep farmers in Tamil Nadu

**N Sri Balaji, S Ramakrishnan, J Muralidharan, D Anandha Prakash Singh and V Sankar**

DOI: <https://doi.org/10.22271/veterinary.2024.v9.i6j.1948>

### Abstract

A cotton gin trash is a by-product generated when cotton fibres are separated from cotton seed in the gin. It is commonly used as a roughage supplement by sheep farmers in Karur and Tiruppur districts of Tamil Nadu without much scientific information on its toxic content and feeding value. Based on field study, six samples of each coarse (*Kotta panju*) and fine (*Micro waste panju*) cotton gin trash samples were collected and pesticides were screened by the Gas chromatography -Mass spectrometer and revealed that pesticides were not detected in both types of cotton gin trash samples. The heavy metals were quantified using inductively coupled plasma-Mass spectrometer. The arsenic level in coarse and fine were  $0.43 \pm 0.04$  ppm and  $0.42 \pm 0.04$  ppm. The cadmium level was  $0.080 \pm 0.01$  and  $0.075 \pm 0.01$  in coarse and fine samples respectively. The chromium content of the fine samples ( $3.50 \pm 0.12$ ) was significantly ( $p < 0.05$ ) higher than the coarse cotton gin trash samples ( $3.36 \pm 0.11$ ). Mercury and lead were not detected in any of the samples. The results shown Chromium, Arsenic and Cadmium were found within the acceptance level in both types of cotton gin trash and the study confirmed that there were no toxic residues in the cotton gin trash and it could be used as a feed supplement in sheep.

**Keywords:** Cotton gin trash, roughage feed supplement, Mecheri sheep

### Introduction

Cotton ginning is a procedure that separates cotton fibers from cotton bolls and serves as a bridge between the cotton agricultural industry and the industrial sector, which produces textiles. While using the thumb and forefinger to extract the fiber from the seed is feasible, it is a difficult and time-consuming process that most likely sped up the development of the first cotton gin (Lakwete, 2003) [5]. Cottonseed, cottonseed meal, and cottonseed hulls are among the by-products produced during this procedure. When cotton fibers are extracted from cotton seed at the gin, one such by-product is cotton gin trash.

Cotton gin waste was mostly disposed of by spreading it across the ground, composting it, feeding it to animals, disposing of it in a landfill, burning it, turning it into energy, creating pellets for heat stove fuel, construction materials, and insulation (Cohen and Lansford, 1992) [1]. Since cotton gin waste has been used in ruminant feeds for the majority of the world's history (Kennedy and Rankins, 2008) [2], it has the potential to be incorporated into livestock diets as an alternative feed source of protein, fat, and fiber (Rogers *et al.*, 2002) [6]. It is also being used to satisfy the energy and protein needs of sheep. According to Crossan and Kennedy (2008) [2], cotton gin trash is a complex mixture of woody pieces of cotton bolls, stalks, mulched leaves, twisted cotton fiber leftovers, dirt, and dust particles.

In the majority of areas in the districts of Karur and Tiruppur, farmers raise Mecheri sheep and use cotton gin waste as a roughage supplement feed for their animals, mostly during the summer months when there is a scarcity of fodder. Because there are more textile firms in the aforementioned locations, there is an abundance of cotton gin garbage, which sheep farmers are using extensively without any scientific proof on the toxic residues in the cotton gin trash. The current study was undertaken to assess the toxic residues in cotton gin trash which are being used in a great extent by the sheep farmers in Tamil Nadu.

## Materials and Methods

The pesticides of organochlorine such as Alpha BHC, Beta BHC, Gamma BHC and Delta BHC, DDT, Endosulphan and Organophosphorus compounds like Malathion, Dichlorovos and Chlorpyrifos like carbofuran and pyrethroids like cypermethrin were screened by the Gas chromatography - Mass spectrometer (GC-MS Agilent 7890 GC and MS5975MS System). The pesticides were separated by multiresidue liquid extraction method and the concentrated samples were injected in GC-MS through autosampler. The chromatographic spectrums were examined with NIST library for pesticides.

The heavy metals such as Cr, As, Cd, Hg and Pb were quantified using inductively coupled plasma-Mass spectrometer (ICP-MS, iCAP Q, Thermo Scientific). About 0.5 g of the sample was digested with high pure nitric acid, diluted and injected through auto sampler.

## Results and Discussion

The mean ( $\pm$  SE) values of pesticides and heavy metals in coarse and fine cotton gin trash samples are furnished in the Table 1. The results revealed that none of the pesticides were detected in both coarse and fine cotton gin trash samples, which were collected from the field area. It is in accordance with Stewart *et al.* (1998) [7] who reported that chemical residues in cotton gin trash due to application of pesticides and defoliant throughout the growing season of cotton plant did not appear to be present at concentrations that cause a problem to the animal. It could be inferred that when cotton gin trash is stored for long time the possibility of pesticides presence is negligible. It concurred with Crossan and Kennedy (2008) [2] who reported that pesticide residues were measured in stockpiled cotton gin trash over a 2-year period and found fourteen pesticide residues from current agricultural practice including indoxacarb, profenofos, chlorpyrifos, propargite, bifenthrin, ethion and cyhalothrin and concluded that the complex pattern of pesticide residue decay over time because of the simultaneous decomposition of the cotton gin trash matrix.

**Table 1:** Pesticides, heavy metals and gossypol residues (ppm) in cotton gin trash samples

Particulars	Coarse type cotton gin trash (Kotta Panju)	Fine type cotton gin trash (Micro waste panju)	P value
<b>Pesticides</b>			
Alpha BHC	ND	ND	-
Beta BHC	ND	ND	-
Gamma BHC	ND	ND	-
Delta BHC	ND	ND	-
DDT	ND	ND	-
Endosulphan	ND	ND	-
Malathion	ND	ND	-
Dichlorvos	ND	ND	-
Chlorpyrifos	ND	ND	-
Carbofuran	ND	ND	-
Cypermethrin	ND	ND	-
<b>Heavy metals (ppm)</b>			
Chromium	3.36 <sup>a</sup> $\pm$ 0.11	3.50 <sup>b</sup> $\pm$ 0.12	0.023
Arsenic	0.43 $\pm$ 0.04	0.42 $\pm$ 0.04	0.858
Cadmium	0.080 $\pm$ 0.01	0.075 $\pm$ 0.01	0.811
Mercury	ND	ND	ND
Lead	ND	ND	ND

Means bearing different superscripts in the same row differ significantly (P<0.05)

ND: Not deducted Number of observations per cell = 6

The arsenic and cadmium content of both coarse and fine cotton gin trash samples were not significantly different from each other. The arsenic level in coarse and fine were 0.43 $\pm$ 0.04 ppm and 0.42 $\pm$ 0.04 ppm. The cadmium level was 0.080 $\pm$ 0.01 and 0.075 $\pm$ 0.01 in coarse and fine samples respectively. The chromium content of the fine samples (3.50 $\pm$ 0.12) was significantly ( $p$ <0.05) higher than the coarse cotton gin trash samples (3.36 $\pm$ 0.11). Mercury and lead were not detected in any of the samples. Similar findings were reported by Kim *et al.* (2004) [4] who found Arsenic 5 ppm, Lead 30 ppm, Chromium 28 ppm while other toxic heavy metals like Cadmium, Mercury and Selenium were not detected in semi-quantitative element analysis of cotton gin trash samples. On the contrary, they found that arsenic ranged from 4.5 to 8.8 ppm, Chromium ranged from 10 to 43.20 ppm and lead was not detected in the quantitative analysis of cotton gin trash samples. Moreover, the level of arsenic and cadmium in the present study were within the normal acceptable level as recommended by NRC (2005) and AAFCO OP (2019). The level of chromium also was within the normal level as recommended in ruminant diet.

## Conclusion

The study confirmed that there were no toxic residues like pesticides and heavy metals found in the cotton gin trash and it could be used as a feed supplement in sheep.

**Conflict of Interest:** Not available.

**Financial Support:** Not available.

## References

- Cohen TM, Lansford RR. Technical report on survey of cotton gin and oil seed trash disposal practices and preferences in the Western U.S. Las Cruces, New Mexico: New Mexico State University Agricultural Experiment Station; c1992.
- Crossan AN, Kennedy IR. Calculation of pesticide degradation in decaying cotton gin trash. Bull Environ Contam Toxicol. 2008;81:355-359.
- Kennedy JB, Rankins DL. Comparison of cotton gin trash and peanut hulls as low-cost roughage sources for growing beef cattle. Prof Anim Sci. 2008;24:40-46.
- Kim S, Park SK, Daugherty KE. Some physical characteristics and heavy metal analyses of cotton gin waste for potential use as an alternative fuel. Korean J Chem Eng. 2004;21:640-646.
- Lakwetem A. Inventing the cotton gin-machine and myth in antebellum America. Baltimore, MD: Johns Hopkins Univ Press; c2003.
- Rogers GM, Poore MH, Paschal JC. Feeding cotton products to cattle. Vet Clin Food Anim. 2002;18:267-294.
- Stewart RL, Bader MJ, Harris GH. The evaluation of cotton gin trash as a cattle feed. University of Georgia, Animal and Dairy Science Annual Report; c1998.

### How to Cite This Article

Balaji NS, Ramakrishnan S, Muralidharan J, Singh DAP, Sankar V. Evaluation of toxic residues in cotton gin trash used as a roughage supplement by sheep farmers in Tamil Nadu. International Journal of Veterinary Sciences and Animal Husbandry. 2024;9(6):627-628.

### Creative Commons (CC) License

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.