

## Toxic Effects of Biuret in Urea on the Growth and Yield of Crops

By

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### ABSTRACT

The different concentrations of biuret viz. 1, 3, 6 and 9 per cent sprayed on rice and cotton did not affect the yields. There was very severe scorching of the leaves with six and nine per cent biuret sprayed on both the crops. But new leaves emerged after a fortnight and later the growth was normal. The difference in yield of rice grain and cotton kapas between treatment is not significant. Urea samples with a biuret of 0.8 to 2.0 per cent (to a maximum of 3.0 per cent) could be used for foliar spray without any deleterious effects on the growth and yield of crops.

### INTRODUCTION

Depressions in yield when urea with 3 per cent biuret applied to soil and one per cent biuret applied as a foliar spray were reported by Mayur and Barbier (1963). Jurkowski (1967) concluded that maize yields were decreased by 15–45 per cent and flax yields by 17–37 per cent by biuret. Selke and Ekert (1965) observed significant yield depressions in oats, maize, sunflower and mustard when urea with more than two per cent biuret was used. Devince and Holmes (1963) stated that urea with less than one and about 4 per cent biuret gave similar yields. Due to long storage or high temperatures the biuret content of urea samples may exceed 1.5 per cent which is the upper limit fixed by fertiliser control order. To study the effect of higher content of biuret even upto 9 per cent in urea samples on the growth and yield of rice and cotton, experiments were conducted and the results are presented in this paper.

### MATERIALS AND METHODS

Six samples of urea available in the local market, manufactured by different firms were analysed for the biuret content adopting the method described in A. O. A. C. The urea sample containing one per cent biuret was used for the experiment.

A pot culture experiment with IR 20 rice in wetland soil and field experiment with MCU 4 cotton in a garden land with 17 treatments and 3 replications adopting randomised block design were conducted. The fertiliser dose adopted for rice was 75:35:35 and for cotton was 24:7:7 kg per acre. Entire amount of P and K was applied as basal dose and nitrogen as urea was applied in 2 doses both basally and top dressing as per treatments. The top dressing was done by both soil and foliar application on 30th day of transplanting for rice and 35th day of sowing for cotton. The concentrations of biuret in the

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urea sample was increased by adding calculated amounts of pure sample of biuret.

## RESULTS AND DISCUSSION

The results of the analysis of locally available urea samples for their biuret content is presented in Table 1 and the yield of rice straw and grain and cotton kapas are given in the Table 2. In the pot culture experiment with rice IR 20 it was observed that 6 and 9 per cent of the biuret in urea caused severe damage and more or less all the foliage were scorched after the spray. But in 1 and 3 per cent biuret spray mostly the tip and in some cases the margins of the leaves were dried up. In all cases new leaves emerged after ten days and the growth of the crop was normal after a

fortnight of spraying. The yield of grain and straw was statistically analysed. It was noticed that the treatment received  $\frac{1}{4}$  N basal and  $\frac{1}{2}$  N foliar spray with 3 per cent biuret recorded the maximum yield of grain. Even though the difference between the treatments was not statistically significant high concentrations of biuret slightly reduced the yield of rice.

TABLE 1. Biuret content of locally available urea samples

Source of urea	per cent of biuret
Madras Fertilisers	2.0
Neyveli	1.3
Poland	1.1
FACT	1.0
Paris	0.8
Bulgaria	1.1

TABLE 2. Yield of Rice and Cotton

(Mean of three replications)

Basal dressing	Top dressing	Rice		Cotton kapas kg
		Grain g/pot	Straw g/pot	
Control $\frac{1}{4}$ N urea	$\frac{1}{2}$ N as top dressing to soil	23.32	44.47	346
$\frac{1}{4}$ N urea	$\frac{1}{2}$ N as foliar spray with 1% biuret content	23.38	33.93	323
$\frac{1}{2}$ N urea	$\frac{1}{2}$ N as foliar spray + 3% biuret	24.53	29.13	199
$\frac{1}{2}$ N urea	$\frac{1}{2}$ N as foliar spray + 6% biuret	25.30	27.42	276
$\frac{1}{2}$ N urea	$\frac{1}{2}$ N as foliar spray + 9% biuret	20.58	27.33	151
$\frac{1}{2}$ N urea	$\frac{1}{4}$ N top dressing to soil only	22.80	32.50	277
$\frac{1}{2}$ N urea	$\frac{1}{4}$ N as foliar spray with 3%	21.28	26.83	187
$\frac{1}{2}$ N urea	$\frac{1}{4}$ N as foliar spray with 6%	24.65	26.93	159
$\frac{1}{2}$ N urea	$\frac{1}{4}$ N as foliar spray with 9%	25.02	25.30	191
$\frac{1}{4}$ N as basal	$\frac{1}{2}$ N top dressing to soil only	25.88	35.32	184
$\frac{1}{4}$ N as basal	$\frac{1}{2}$ N as foliar with 3% biuret	27.75	30.38	232
$\frac{1}{4}$ N as basal	$\frac{1}{2}$ N as foliar with 6% biuret	22.28	23.85	140
$\frac{1}{4}$ N as basal	$\frac{1}{2}$ N as foliar with 9% biuret	26.10	26.53	147
$\frac{1}{4}$ N as basal	$\frac{1}{4}$ N as top dressing to soil only	21.95	28.13	242
$\frac{1}{4}$ N as basal	$\frac{1}{4}$ N as foliar spray with 3%	22.30	27.57	221
$\frac{1}{4}$ N as basal	$\frac{1}{4}$ N as foliar spray with 6%	21.85	26.40	328
$\frac{1}{4}$ N as basal	$\frac{1}{4}$ N as foliar spray with 9%	25.13	27.45	239
		N. S.	N. S.	N. S.



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In the field experiment with cotton MCU 4 the same trend was observed in the growth i. e. 6 and 9 per cent biuret sprays caused severe damage to the leaves, while in 1 and 3 per cent sprays the scorching was moderate. In all cases the crop was normal after a fortnight of spraying where new leaves emerged. The yield of cotton kapas was statistically analysed and the difference between the treatments was not significant.

Analysis of soil samples after the harvest of the crop revealed not much differences in its level of available nitrogen, phosphorus and potassium and pH and electrical conductivity.

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