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SHORT COMMUNICATION

EFFECT OF UREA TREATED WITH CRUSHED NEEM SEED ON GROWTH AND YIELD OF MILLET (*Pennisetum glaucum* (L). Br.) IN NORTH-WESTERN NIGERIA

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Introduction

Many tropical soils particularly those of savannah regions are predominantly sandy with rapid decline in soil productivity as a result of reduced soil fertility and deterioration of soil physical conditions (Youdeowei *et al.,* 1985*).* Most soils in Nigeria are potentially low in fertility and cannot sustain high crop yields (Tarfa *et al.,* 1993). Gaseous losses of nitrogen under some conditions may range from 40 to 60% of the applied nitrogen. Substantial amount of applied nitrogen fertilizers such as urea get lost through de-nitrification, leaching and volatilization.

Neem seeds contain an ingredient that blocks soil bacteria from converting nitrogenous compounds into un-useful nitrogenous gas. Neem products are also organic in nature and do not only reduce loss of nitrogen after application, they also add plant nutrients. They do not cause soil toxicity, neither do they lead to pollution of the ecosystem (NRC, 1992*).* According to Khushk and Mal (2007), urea blended with neem seed helps to prevent loss of nitrogen by way of preventing leaching, volatilization and quick nitrification.

Pearl millet [*Pennisetum glaucum* (L.) Br.] belongs to the family Poacea, sub-family Panicoideae, genus Pennisetum and tribe Paniceae (ICRISAT, 2006). Poor soil fertility and mismanagement of plant nutrients are some of the limiting factors for millet production in Sudan Savanna of Nigeria (Roe, 2006). The efficiency of blending urea with crushed neem seed powder in reducing nitrogen losses in the soil after application was investigated on the growth and yield of millet was in Sokoto, North Western Nigeria.

Materials and Methods

Study Area

A field experiment was conducted in the rainy season of 1999 at the Usmanu Danfodiyo University Teaching and Research Farm in Dundaye District, Sokoto, located in the Sudan Savannah agro-ecological zone (Latitude 13^0 01' N and Longitude 5^0 15' E) about 350 m above sea level (Kowal and Knabe, 1972). The area has an annual rainfall of 550-700mm, and about 90% of the soil is predominantly sandy with frequent wind erosion and sand deposition common during harmattan periods (Singh and Babaji, 1989). Soil samples were collected randomly at a depth of 0-15cm and 15-30cm at the experimental site prior to land preparation. The physico-chemical properties of the soil were determined in the laboratory using standard methods..

Preparation of Crushed-Neem Seed Treated Urea

Crushed neem seed was prepared from fallen dried-mature neem seeds obtained from neem trees in the premises of the permanent site of Usmanu Danfodiyo University, Sokoto. After removal of the seed coats, seeds were further dried in the oven, then crushed using mortar and pestle, sieved with a 2 mm sieve to obtain neem powder and weighed according to percentages required for blending with urea at recommended rate of 100 kg/ha (Railey, 2006) to obtain 0, 15, 30 and 45% of crush neem seed (CNS). Each was mixed as CNS-treated with urea was applied as both basal and split, forming eight treatments including control where no CNS was applied. The eight treatments were as follows: 0% CNS+Urea (basal), 0% CNS + Urea (split), 15% CNS + Urea (basal), 15%+Urea (split), 30% CNS+Urea (basal), 30% CNS + Urea (split), 45% CNS + Urea (basal) and 45% CNS + Urea (split). Before application the various levels of CNS were mixed thoroughly with the recommended rate of urea. Land at the experimental site was ploughed using a tractor.

Field Layout and Sowing

Field experimental layout consisted of eight plots of 2m x 4m ($8m^2$) with one meter between plots in a Randomized Complete Block Design (RCBD) replicated three times. An improved early maturing variety of millet (SOSAT C-88) with compact panicles and short stems was used as the test crop. Seeds were dressed with Apron star 50D (one sachet per 4 kg of millet seeds) before dibbling. Ten seeds were planted at a depth of 2-3 cm and spaced 70 x 30 cm. There were five rows per plot, and each row comprised of six stands, making 30 stands per row. Plants were thinned to three stands per hill two weeks after sowing. Weeding was carried out, twice i.e at second and eight weeks after sowing manually using hand hoe. Basal doses of crushed neem seed (CNS) and urea were applied two weeks after sowing, worked into the soil using hoe, and the remaining split doses of urea and CNS were applied six weeks after planting.

Data Collection and Analysis

Data on plant establishment count, stem girth, stem height, panicle weight and total dry matter produced were taken according to plots and analysed using Analysis of Variance (SAS, 2003).

Results and Discussion

Establishment Count and Growth Parameters

The results on the efficiency of urea blended with crush neem seed with either basal at land preparations or split application (applied twice at land preparation and six weeks after planting) did not show significant differences (P>0.05) on establishment count, as shown in Table 1. This shows that application of CNS did not have any effect on the germination of the seeds. A non-significant (P>0.05) effect on stem girth diameter of millet was obtained (Table 1), showing that treating urea with CNS did not increase stem girth. The highest stem girth diameter was obtained by treating urea with 45% CNS, with the control plot having the lowest stem girth, thus showing efficient utilization of nitrogen by the test crop as a result of the effectiveness of CNS in reducing soil nitrogen loss (Table 1). CNS-treated urea lead to increase in stem height (Table 1). This is in agreement with the findings of Thind *et al.* (2009), who reported that neem coated urea applied to crops can result in high nitrogen efficiency, as it has nitrification inhibition properties.

Table 1: Effect of crushed neem seed treated urea on growth and yield of millet

Treatment	Parameter				
	Estab. count	Stem girth (cm)	Stem height (cm)	Panicle weight (kg)	Total dry matter (kg)
U+0% CNS(S)	27.0	14.17	152.0^{b}	1.2^{b}	5.2^{ab}
U+0% CNS(B)	26.7	13.80	148.3^{b}	1.1^{b}	5.2^{ab}
U+15% CNS(S)	28.0	14.63	160.9^{ab}	1.4^{ab}	7.5^{a}
U+15% CNS(B)	24.7	13.90	155.0^{ab}	2.1^{ab}	5.3^{ab}
U+30% CNS(S)	24.7	14.00	155.9^{ab}	2.0^{ab}	6.3^{a}
U+30% CNS (B)	25.3	14.57	164.1^{a}	2.3^{ab}	5.4^{ab}
U+45% CNS (S)	29.0	13.67	165.8^{a}	2.4^{a}	6.0^{ab}
U+45% CNS (B)	26.0	14.13	157.8^{ab}	1.9^{ab}	5.7^{ab}
Control	29.7	13.20	142.5^{b}	1.3^{b}	2.9^{b}
S E ±	1.28	0.61	5.53	0.26	0.036
C V	8.2%	34.1%	6.15%	0.024%	36.6%

Means in a column followed by the same letter(s) are not significantly different (P>0.05) .
CNS = crushed neem seed; S = Split; B = Basal applications; U = Urea

Yield and Yield Components

Urea blended with 45% CNS applied in split dose significantly increased panicle weight and total dry-matter, followed by urea blended with 30% CNS basal application, depicting the ability of crushed neem seed in ensuring nitrogen availability to enhance millet yield. This agrees with the results obtained by Rayar (1989); Khushk and Mal (2007) and Thind *et al*. (2009) who reported that treating urea with CNS significantly increased the yield of crops such as millet, rice and sorghum, due to increased assimilation of nitrogen at reproductive phase. Lower panicle weights and total dry matter were obtained on control plots where only urea was applied without CNS. This shows the effects caused by soil nitrogen losses after application. From the results obtained (Table 1), higher doses of CNS increased millet development with either basal or split application, likely indicating that treating nitrogenous fertilizers such as urea with neem seed may lead to increased productivity of millet. This finding is strongly supported by Cooke (1974) and Rayar (1989) who reported that application of urea treated with 30% crushed neem seed either as

basal or in split doses is highly advantageous to sorghum production in semi-arid regions of Northern Nigeria.

In conclusion, the results obtained in this study indicate that neem seed used to treat nitrogenous fertilizer (Urea) could be used in reducing nitrogen losses in the soil through application of 45% crushed neem seed in split doses. This level could greatly increase millet growth and grain yield.

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