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Nitrogen Loading on Natural Cellulose to Create a Control Release of Agricultural Gel Fertilizer: A Short Review

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Introduction

Gel fertilizer is a modern type of slow-release fertilizer with a gel-like consistency that allows the loading of positively charged elements because the extracted cellulose contains a negative charge. Examples: loading urea on extracted cellulose and loading urea, calcium, potassium, and ammonium nitrate.

Methodology

Loading urea (N source) on Cellulose by A stock solution of 50 %w/v urea (23% N) was prepared in DW. Then added Cellulose to the urea solutions. The mixture was stirred using an electric blinder and it was left still for 24-48 hr. at room temperature. The stability of the gel fertilizer was periodically checked for consistency [1]. By estimating and knowing many indicators like FTIR, XRD [2], and knowing the effect of the new gel fertilizer on the germination of wheat seeds, the growth and productivity of the wheat crop, and on soil health by estimating and knowing many indicators like Germination percentage, root length, chlorophyll index, nutrients uptakes, harvest index, available of NP in soil and total count of bacteria and fungi.

Discussion

The effect of gel urea fertilizer loaded on natural cellulose on the germination of wheat seeds, the results showed that the use of natural cellulose increased root length, specific surface area and vigor index [3-6]. Wheat (Giza 171) is cultivated in a pot experiment under greenhouse conditions using sandy soil and After 83 days of sowing, the different morphological characteristics of wheat plants (plant height, spike length, plant dry weight, fresh weight, root length, spike dry weight, root fresh weight, root dry weight, water content of shoot, harvest index and lifespan) were measured. The nutrient uptake (nitrogen, potassium and phosphorous) and available of soil nitrogen and phosphorous were also measured. It was found that the addition of natural cellulose loaded with urea applied by the foliar method was statistically the best treatment for increasing most of the growth indicators, as well as reducing the lifespan of the spikes by 30.1% compared to the control. The degradation or late of wheat seedlings was observed in some soil application treatments of natural cellulose loaded with urea, as well as the change of surface soil color to greenish and dark brown. Therefore, a laboratory experiment was designed to investigate the effect of the applied treatments on some chemical and biological properties of the soil [1].

To test the effect of adding different concentrations of urea-loaded natural cellulose and in the absence of urea, on different soil properties. A mass of 488 g of air-dried soil (θm= 0.5%) was packed into free-draining plastic cups, at a bulk density of 1.65 g.cm-3. The recommended fertilizer rates were added to the soil. The soil was saturated by capillarity with natural cellulose loaded with urea or without. The soil was left for free drainage to reach the field capacity. The soil was subjected to several cycles of wetting and drying for a period of 100 days under laboratory conditions (18.5 - 22.0 ^{0}C). The cumulative soil water evaporation rate was measured by weight loss method. The total count of bacteria and fungi was estimated, the type of fungi was identified, the

availability of soil nitrogen and phosphorous, and the soil pH. The results showed that the natural cellulose significantly increased the acidity of the soil (lower pH) without urea loaded. The use of natural cellulose in the presence of urea increased the availability of nitrogen in the soil [3]. The use of urea-loaded natural cellulose increased the availability of phosphorous in the soil. In addition, the urea-loaded natural cellulose treatments reduced types as well as the total count of pathogenic fungi (to 15-fold) and increased the total count of bacteria in the soil (to 20-fold) compared with the same concentrations of natural cellulose without urea [1-3].

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