

**EFFECT OF UREA ON THE GERMINATION AND GROWTH OF RED GRAM
(*Cajanuscajan L*) AND MAIZE (*Zea MaysL*)**

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Abstract

Red gram (*Cajanuscajan L*) also known as kandulu, tur, pigeon pea or arhar is a very important food crop in India. It is the second most important pulse in India after Bengal gram. The ability of red gram to give high economic yields under soil moisture deficit makes it an important crop in rain fed and dry land agriculture (1).Pigeon pea grows in arid and semiarid regions. It is used traditionally as food, fodder and fuel.

Maize, also known as Cornor Mokkaionna is one of the most important cereals in the world. Maize can be grown over a range of agro-climatic zones and this quality makes it a versatile crop (2).Maize is the third most important cereal after rice and wheat for human food (3). It is the third in the world after wheat and rice, in area of cultivation and production.

Urea is a popular form of N fertilizer due to its high N analysis, ease of handling and storage, and relatively low cost.(4).

Urea is a good source of nitrogen for plants.. Urea, also known as carbamide, is an organic compound with chemical formula $\text{CO}(\text{NH}_2)_2$. This amide has two $-\text{NH}_2$ groups joined by a carbonyl ($\text{C}=\text{O}$) functional group. Nitrogen is a major essential nutrient for plants. It is present in many biochemical compounds like DNA, RNA, ATP, amino acids, proteins, NAD, enzymes and coenzymes. Effects of urea on germination of wheat was studied by Walter R Zich (5). Xiaoli Qi et al studied the effect of urea on the seed germination in rice (6).. Sanchita Bhattacharya et al studied the effects of urea on the seed germination in green gram and black gram (7).

Study of the effect of different concentrations of urea on the germination and growth of red gram and maize, helps in determining the optimum concentration of urea that can be used for these crops to improve soil fertility.

Key words: Germination, Growth, Urea, Concentration, red gram, maize

Introduction

Red gram (*Cajanuscajan* L) also known as kandulu, tur, pigeon pea or arhar is a very important food crop in India. It is the second most important pulse in India after Bengal gram. The ability of red gram to give high economic yields under soil moisture deficit makes it an important crop in rain fed and dry land agriculture (1).Pigeon pea grows in arid and semiarid regions. It is used traditionally as food, fodder and fuel.

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Bateman et al studied the effects of urea on 20 native plant species of Australia (8). Gasser studied the effect of urea on the seed germination of kale, barley and wheat (9). Bremner and Krogmeier reported that the adverse effects of urea on seed germination may be due to the release of ammonia from urea in the soil. (10)

Study of the effect of different concentrations of urea on the germination and growth of red gram and maize, helps in determining the optimum concentration of urea that can be used for these crops to improve soil fertility..

Materials and Methods

The seeds of maize and red gram are obtained from the local market. Soil from the open field in the college campus is filled in pots. Seeds are soaked in water for 24 hours and then the seeds are sown in pots at a depth of 1 inch. The plants are uniformly watered. Urea is dissolved in distilled water and applied at different concentrations of 0% (Control), 1%, 2%, 3% and 4%. For every treatment 15 plants are used. After 5th, 7th and 10th day 5 plants for each treatment are taken out. The length of the shoot, the length of the root are measured with a scale.

Fresh weight and dry weight of the seedlings is measured on the 10th day. Fresh weight is measured with a single pan balance. For dry weight, the plants are kept in hot air oven at about 80°C for 24 hours.

Germination percentage is calculated by the following formula:

Germination percentage = number of seeds germinated x 100/ total number of seeds sown.

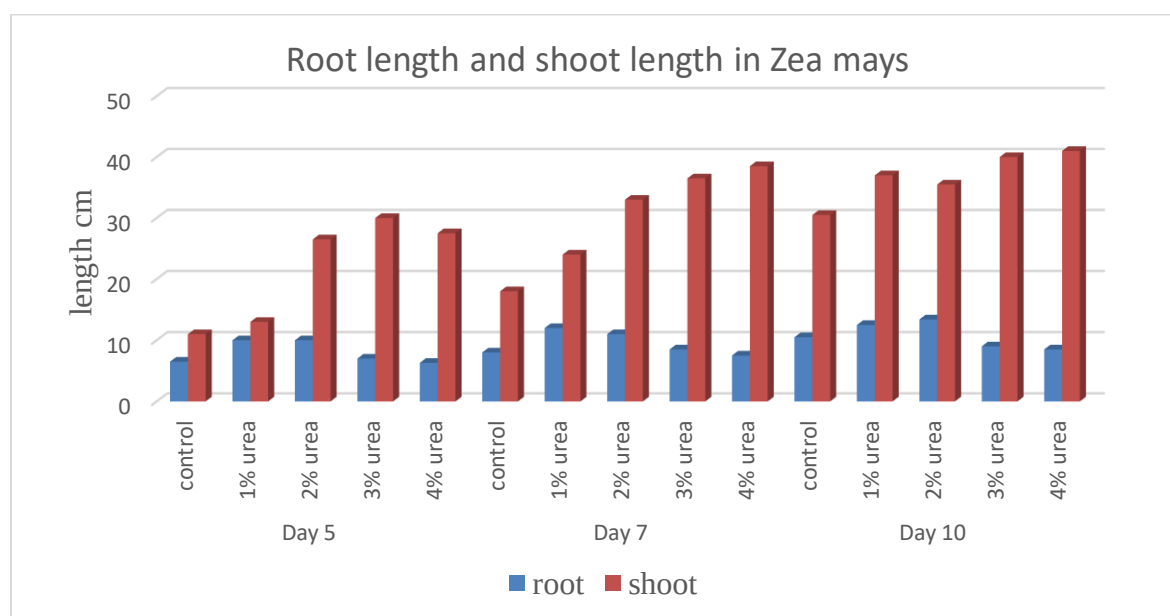
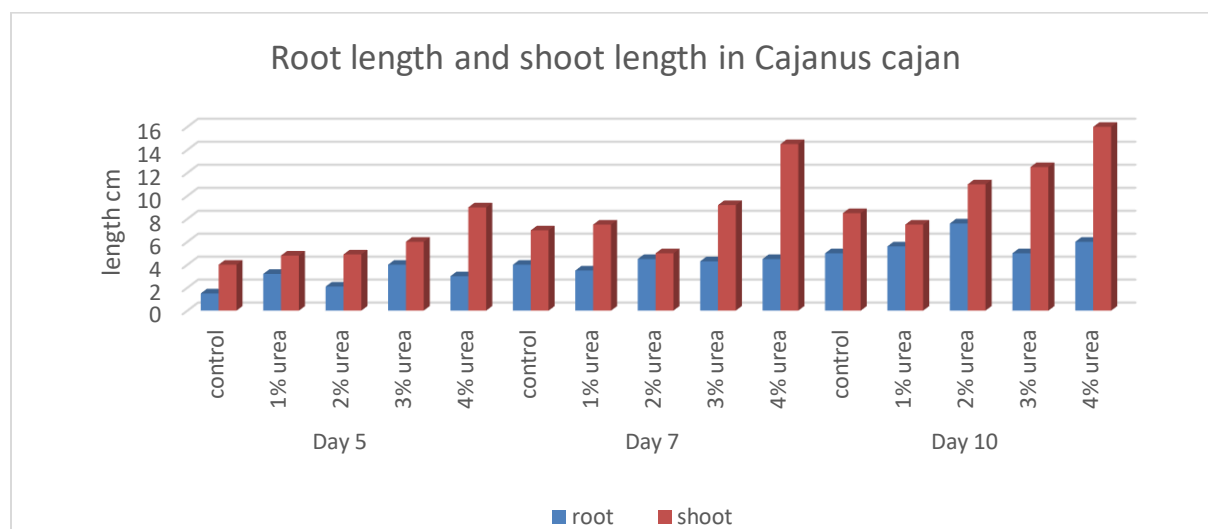
Results and Analysis

Germination percentage in Zea Mays

Control	1% Urea	2% Urea	3%% Urea	4% Urea
90	86	84	78	70

Germination percentage in Cajanus cajan

Control	1% Urea	2% Urea	3%% Urea	4% Urea
80	78	76	70	62

Root length and shoot length in Cajanuscajan:

Root length and shoot length in Zea Mays:

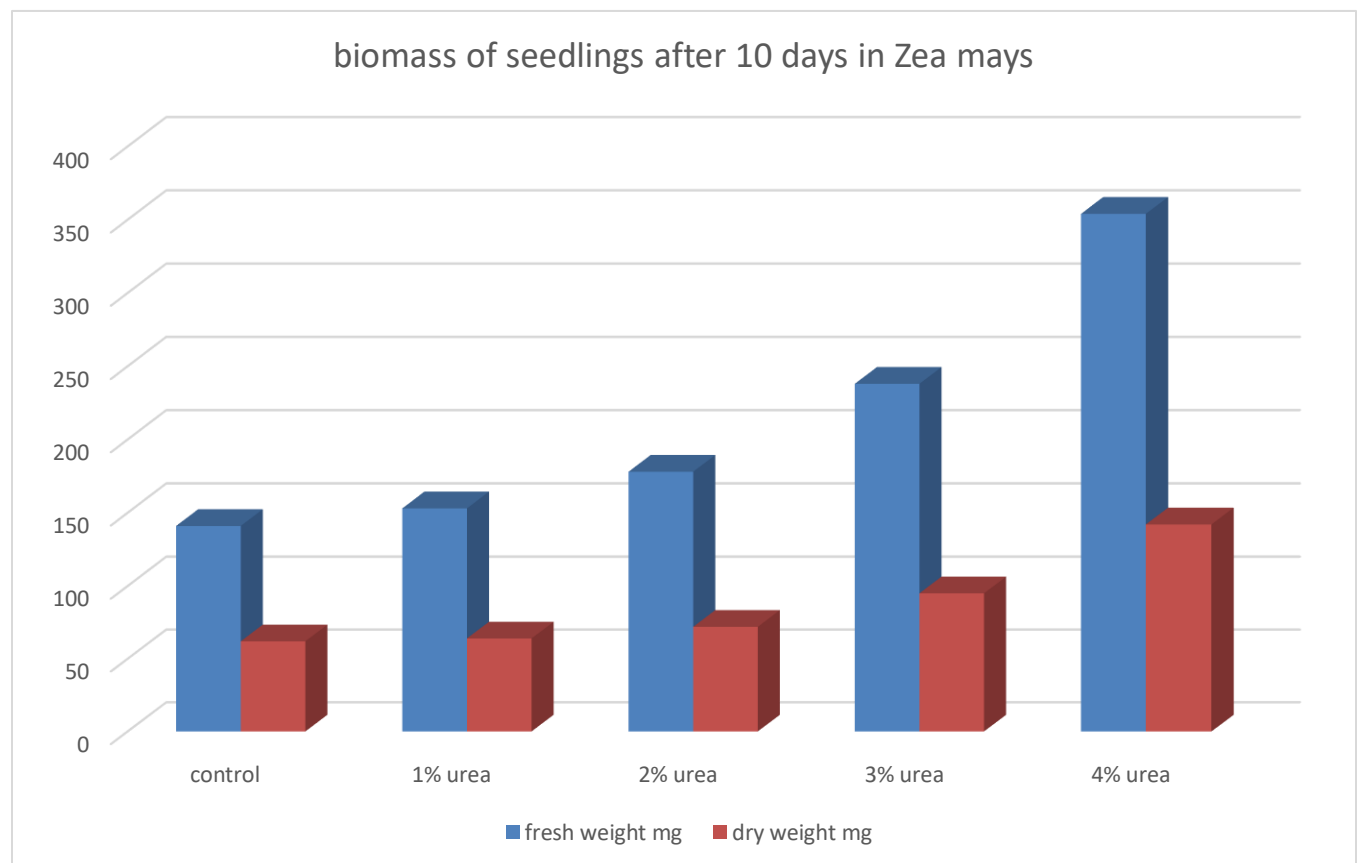
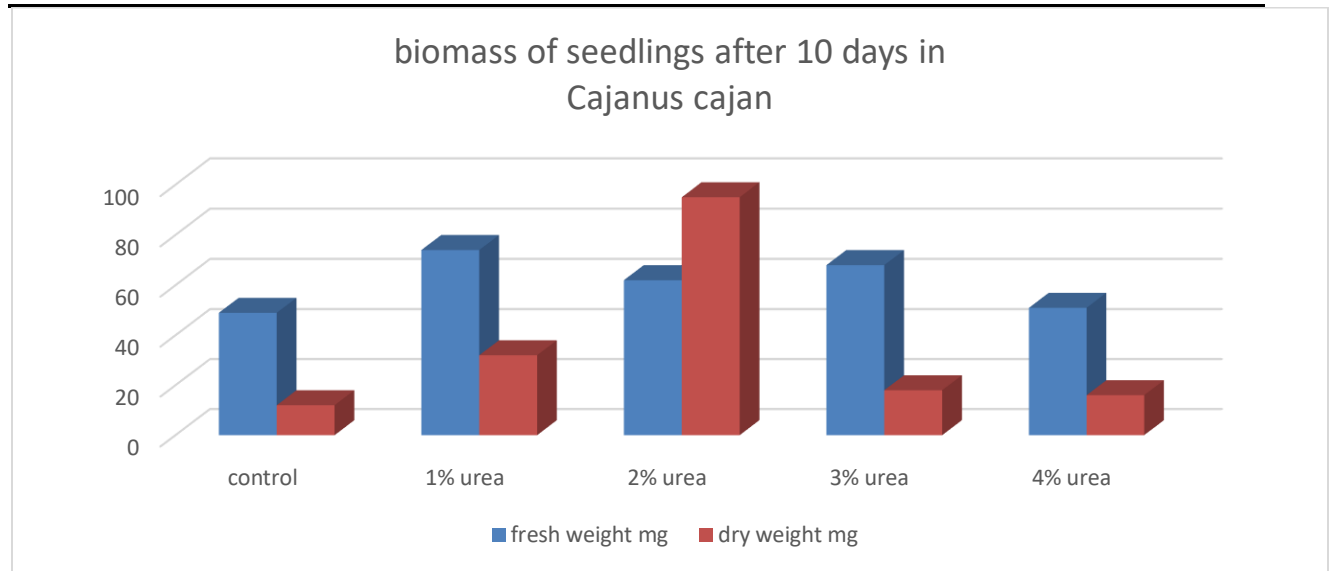
Days	treatment	Root length (cm)	shoot length (cm)
Day 5	control	6.5	11
	1% urea	10	13
	2% urea	10	26.5
	3% urea	7	30
	4% urea	6.3	27.5
Day 7	control	8	18
	1% urea	12	24
	2% urea	11	33
	3% urea	8.5	36.5
	4% urea	7.5	38.5
Day 10	control	10.5	30.5
	1% urea	12.5	37
	2% urea	13.4	35.5
	3% urea	9	40
	4% urea	8.5	41

Fresh weight and dry weight of Cajanuscajan seedlings after 10 days:

treatment	fresh weight mg	dry weight mg
control	49	12
1% urea	74	32
2% urea	62	95
3% urea	68	18
4% urea	51	16

Fresh weight and dry weight of Zea mays seedlings after 10 days:

treatment	fresh weight mg	dry weight mg
control	141	62
1% urea	153	64
2% urea	178	72
3% urea	238	95
4% urea	354	142



Findings and conclusions:-

Application of urea is found to have a negative effect on seed germination in both Cajanuscajan and Zea mays. It suggests that urea should be used only after the germination of seeds.

2% urea is giving the best results in terms of increase in biomass in case of Cajanuscajan, whereas in Zea mays 4% urea gave best results.

Concrete conclusions can be drawn only after the studying a much larger sample size, and more controlled environmental factors including soil composition, soil pH, moisture, temperature and light.

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