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Effect of different levels of phosphorus on growth and fodder quality of cowpea A: Review

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Abstract
Phosphorus is a significant nutrient for expanding efficiency of legumes crop. It is needed for plant development and root improvement. The three level of phosphorus (40, 60, 80) kg per ha as single super phosphate. In examination the impact of phosphorus level on development, number of turners, quality and yield of cowpea. The level of phosphorus 80 kg for each ha came about better development, nodulation and green forage yield and 40 kg for every ha has lower development, nodulation and green forage yield. The information with respect to the utilization of ideal portion supplements particularly phosphorus is not kidding concern. The writing about the development of growth cowpea (*Vigna unguiculata* L.) comparable to phosphorus is reviewed in this paper.

Keywords: Growth, quality parameters, phosphorus

Introduction
Cowpea (*Vigna unguiculata* L.) is a large-seeded legume crop grown for its protein rich green pods, grains and stover by poor farmers under developed and developing countries. Cowpea commonly known as "*Lobia*" has a number of common names, including Crowder pea, black eyed pea, china pea etc. The beans are nutritious and provide complementary proteins to cereals. The seeds of cowpea comprise (20-24%) protein, 63.3% carbohydrates and 1.9% fat. Worldwide, cowpea is cultivated on a total area over 11.2 million hectares with a total production of 3.2 million tonnes (Fatokun *et al*., 2012) [3].
Fodder from cowpea is also highly valued for livestock. It can be grown as a relay inter-crop with cereals or other crops in mid, if maturing varieties were used for fodder. Cowpea plants are tolerant to drought, high temperature and soil acidity and their ability to fix atmospheric nitrogen contribute to their fast growth habit in tropical climates characterized by low rain fall, high temperature and soil with low fertility. Depending on the variety, cowpea performs well in agro ecological zones where rainfall ranges between 500 mm to 1200 mm per year (Madamba *et al*., 2006) [8]. The grains are major source of plant proteins and vitamins for man, feed for animals, young leaves and immature pods are eaten as vegetable and also source of money income (Sheahan, 2012) [14].
Phosphorus has been reported to reinforce the formation of lateral, fibrous and adventitious roots, which play a very important role in N2 fixation, nutrient and water uptake (Rahman *et al*., 2008) [12]. It's one in every of the foremost important soil major nutrients for crop production especially legumes, it's rated the second to nitrogen in terms of its importance to crop performance (Halder and Panda, 2014) [4]. Therefore the requirement of P for cowpea is quite higher than nitrogen in the form of single super phosphate (Nkaa *et al*., 2014) [10]. Supply and demand scenario of forage and roughages for 1995-2025 also provide the figure of actual deficit as per cent demand for green forage 696 million tons and dry roughages 143 million tons foe year 2015 which is based on Eleventh five year plan document, Government of India (Anonymous, 2007).

Effect of phosphorus level
Growth parameters: It was observed that, phosphorus is that Key Plant supplement associated with energy transfer inside the plant chemical reactions Rathore *et al*., (2015) [13]. The plant height, number of tillers, functional leaves per plant expanded fundamentally with increase in the leaves of phosphorus fertilization (Prasad. 2007) [11].

Bhagat *et al*., (2018) [1] reported that application of phosphorus up to 80 kg P_2O_5 per ha resulted increase the plant height of Fodder Cowpea (6.59%) as compare tov40 kg P_2O_5 per ha. The stimulating effect of phosphorus on growth of crop might due to readily availability of applied phosphorus which promoted cell division, better root growth and increase intermodal length at higher level nutrient.

Kumar *et al*., (2012) [6] detailed that utilization of phosphorus 80 kg P_2O_5 ha resulted maximum number of nodules per plant and was significantly superior over 60 and 40 kg P_2O_5 ha. They also increase the quality and yield. Meena and Chand (2014) [9] detailed that the quantity of branches per plant in fodder cowpea increased with each progressive of phosphorus up to 60 kg P_2O_5 ha. All growth parameters were significantly influenced due to phosphorus application which ultimately increased the root proliferation and also favoured the extensive exploitation of treated soil areas for nutrient and moisture while energy obtained from photosynthesis and metabolism of carbohydrates is stored in storage compound (ATP and ADP), which eventually reflected in vigorous vegetative growth. Phosphorus also promoted the development of roots thereby favouring the nitrogen fixation in legumes. This increased amount of nitrogen fixed might be utilized by the host plant for its own growth.

Quality Parameters

It was accounted for that, utilization of phosphorus delivered helpful impacts on crude protein content per cent and crude protein yield (q ha-1). The crude protein content was fundamentally expanded with increase within the degree of phosphorus application. The phosphorus application at 80 kg P2O5 ha recorded higher crude protein content (18.38) and crude protein yield (8.46 q ha) which was fundamentally above than all different degrees of phosphorus. The most minimal rough protein content was seen because of utilization of 40 kg P2O5 ha. While crude fiber yield, Acid detergent fiber, Neutral detergent fiber content didn't cross the degree of importance because of the utilization of levels of phosphorus. While the use of phosphorus at 80 kg P2O5 ha was discovered to be altogether higher in regard with ash content (11.73 percent), be that because it may, it was standard with at 60 kg P2O5 ha ash content (11.33) Bhagat *et al*., (2018) [1].

Effect of green forage yield

The different level of phosphorus affected green forage yield essentially, that utilization of 80 kg P_2O_5 ha recorded fundamentally higher green forage yield in terms of q ha-1. However, utilization of Phosphorus at 40 kg P_2O_5 ha-1 recorded the altogether most reduced amount of green forage yield. The most extreme yield because of higher utilization of phosphorus, may be because of the joined impact of taller plants, more number of branches and more number of leaves per plant. Since the green forage yield is that the consolidated aftereffect of these three contributory characters, the yield within the current examination was expanded with expanded degree of phosphorus. Shekara *et al*. (2013) [15] Kundu *et al*. (2015) [7]

Economics: Jha *et al*., (2014) [5] saw that the use of 80 kg P_2O_5 per ha recorded altogether most elevated Green forage yield (244.8 q/ha). Dry matter yield (45.6q\ha) and 40 kg P_2O_5 net return Rs 88895 and benefit cost ratio of 1.96

Dixit *et al*., (2014) [2] the phosphorus application at 60 kg P_2O_5 produced greatest net return of Rs 3500 for each ha in fodeer cowpea.

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