



# KrishiKosh (कृषिकोश)

(/) An Institutional Repository of Indian National Agricultural Research System



(/)

[Advanced Search \(/advanced-search\)](/advanced-search)

[Krishikosh \(/\)](#) / [Birsa Agricultural University, Ranchi \(/handle/1/93542\)](#) / [Thesis \(/handle/1/93550\)](#)

Please use this identifier to cite or link to this item: <http://krishikosh.egranth.ac.in/handle/1/5810095995>

Authors: Choudhary, Deban Kumar (/browse?type=author&value=Choudhary%2C+Deban+Kumar)

Advisor: Karmakar, S. (/browse?type=author&value=Karmakar%2C+S.)

Title: PLANT GEOMETRY AND PHOSPHORUS MANAGEMENT IN LEGUME BASED INTERCROPPING UNDER UPLAND ECOSYSTEM

Publisher: Birsa Agricultural University, Ranchi, Jharkhand-6

Language: en\_US

Type: Thesis

Pages: 101

Agrotags: null

Keywords: PLANT GEOMETRY AND PHOSPHORUS MANAGEMENT IN LEGUME BASED INTERCROPPING UNDER UPLAND ECOSYSTEM

---

**Abstract:** Poor fertility and productivity of rainfed upland soil and vagaries of monsoon in Jharkhand compel to adopt diversified cropping system with low inputs requiring crops. The acreage under pigeon pea, maize and black gram is increasing constantly by replacing the area of rice under upland condition. It is well understood that phosphorus plays a major role in realizing optimum productivity of crops, especially legumes. In the acid lateritic soil, P-fixation is a major problem. Moreover, the costs of phosphatic fertilizers are increasing day by day. Alternatively, use of Nano-P in crop production has been newly recognized as an innovative phosphate supply system. Therefore, it is imperative to explore the possibility of cost-effective P-management practices for maximizing crop yield as well as to find out a suitable intercropping system with a short duration legume like black gram grown as a component crop. Keeping this in view, an experiment was conducted at BAU, Ranchi, during kharif seasons of two consecutive years, 2016 and 2017. The soil was sandy-loam in texture with low organic carbon (4.2 g kg<sup>-1</sup>), moderately acidic (5.4) in nature, low in available nitrogen (171.7 kg ha<sup>-1</sup>), medium in phosphorus (23.21 kg ha<sup>-1</sup>) and potassium (157.8 kg ha<sup>-1</sup>) as well as high in sulphur (12.9 kg ha<sup>-1</sup>). The experiment was laid out in split-plot design with three replications. The treatments consisted of seven crop geometry viz. C1-sole black gram, C2-sole pigeon pea, C3-sole maize, C4-pigeon pea + black gram (1:1), C5-maize + black gram (1:1), C6-pigeon pea + black gram (1:2) and C7-maize + black gram (1:2) in main plots and four phosphorus management practices viz. P1- Control, P2-40 ppm Nano-P, P3- 50% recommended dose of phosphorus (RDP) +40 ppm Nano- P and P4-100% RDP in subplots. Pigeon pea var. UPAS-120, black gram var. Uttara and maize var. Suwan composite-1 were grown with 20:40:20:20, 20:40:20:20 and 120:60:40 kg/ ha N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O and S, respectively. Results revealed that intercropping of maize or pigeon pea with black gram crop improved the growth parameters, yield attributes and yield of pigeon pea, maize and black gram during both the years. Pigeon pea and black gram both under pigeon pea + black gram (1:1) and maize under maize + black gram (1:1) intercropping system recorded improved growth, yield and yield attributes compared to cultivation as sole crop. Pigeon pea + black gram (1:1) recorded maximum BEY (1763 kg ha<sup>-1</sup>), LER (1.64), net return (₹ 61209 ha<sup>-1</sup>), B:C ratio (1.63) and protein yield (405.4 kg ha<sup>-1</sup>) in the system improving the different characters of pigeon pea (main crop) like maximum plant height (199.6cm), dry matter (878 g m<sup>-2</sup>), LAI (1.62), no. of pod plant-1 (85.3), seeds pod- 1 (3.6), 1000-grain weight (93.72), grain yield (1162 kg ha<sup>-1</sup>), harvest index (18.00 %) and protein content (22.88 %) in addition to no. of pod plant-1 (28.6), seeds pod-1 (6.8), 1000-grain weight (40.47), harvest index (23.46 %) and protein content (23.65 %) as well as proportionate dry matter and grain yield (on the basis of population) in black gram grown as intercrop. However, maximum carbohydrate yield (2655 kg ha<sup>-1</sup>) was recorded under maize + black gram (1:1). Lower weed density and weed dry weight at 20 DAS and 40 DAS were registered under all the intercropping system compared to sole pigeon pea or maize. Reduction of weed dry weight in pigeon pea based intercropping system ranged from 10.11 to 10.73 % while 6.94 to 8.71% in maize based intercropping system compared to their respective sole stand. With regards to phosphorus management practices, application of 50% RDP + 40 ppm Nano-P recorded higher value of growth parameters, yield attributes and yield of pigeon pea, maize and black gram along with the status of available P in soil throughout the crop growth period compared to the application of Nano-P alone or no P and remained at par with 100% RDP. Spraying of Nano-P @ 40 ppm only was not sufficient to meet out the phosphorus requirement of the crops. Interaction between intercropping system and phosphorus management was significant and it was found that maximum BEY (1763 kg ha<sup>-1</sup>), protein yield (405.4 kg ha<sup>-1</sup>), total P uptake (2.7 g m<sup>-2</sup>), net return (61209 ` ha<sup>-1</sup>) and B:C ratio (1.63) were recorded under the application of 50% RDP+40 ppm Nano-P in pigeon pea +black gram (1:1) system along with an added advantage of improvement in most of the soil parameters like pH, organic carbon, available-N and K. It may be concluded that for a viable intercropping system under rainfed upland condition in achieving higher system productivity, profitability and sustainability, farmer may prefer pigeon pea + black gram with (1:1) row ratio with 50% recommended dose of phosphorus (20 kg/ha for each crop) + Nano phosphorus 40 ppm in addition to their recommended N, K and S at 20 kg/ha in both the crops.

---

**Description:** PLANT GEOMETRY AND PHOSPHORUS MANAGEMENT IN LEGUME BASED INTERCROPPING UNDER UPLAND ECOSYSTEM

---

**Subject:** Agronomy

---

Theme: PLANT GEOMETRY AND PHOSPHORUS MANAGEMENT IN LEGUME BASED INTERCROPPING UNDER UPLAND ECOSYSTEM

These Type: Ph.D

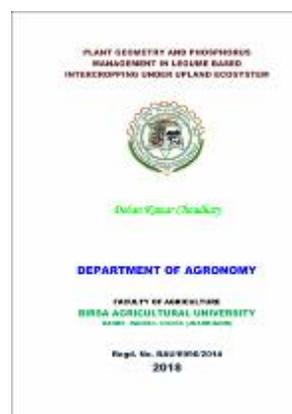
Issue Date: 2018

Appears in Thesis (/handle/1/93550)

Collections:

Files in This Item:

File	Description	Size	Format
1722 Deban Kumar Choudary.pdf		5.57 MB	Adobe PDF



[View/Open \(/displaybitstream?handle=1/5810095995\)](/displaybitstream?handle=1/5810095995)

[Show full item record \(/handle/1/5810095995?mode=full\)](/handle/1/5810095995?mode=full)

[📊 \(/handle/1/5810095995/statistics\)](/handle/1/5810095995/statistics)

Items in DSpace are protected by copyright, with all rights reserved, unless otherwise indicated.