

## **Effect of Lime, Organic Manure and Greenleaf Manuring on Sustainable Production of Greengram-Mustard Cropping Sequence**

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### **Abstract**

A field experiment was conducted in the rainfed upland red and laterite soils for maximising the yield of green gram-mustard cropping sequence through use of lime, organic manure and green leaf manuring on sustainable basis. The highest grain yield of greengram (3.77 q/ha) was recorded in the treatment receiving 5 tonnes FYM /ha along with 20% lime /ha of lime requirement followed by 3.06 q/ha lime at 10% of LR + FYM at 5t/ha was applied. Statistically both were at par with each other. The grain yield of green gram was 2.96 q/ha which received 10% lime with green leaf manuring.

**Key words :** Green gram, Upland soil, Lime.

More than 60% of the cultivable areas of the country remains unirrigated and is rain-fed (1). Dryland or rainfed contributes about 44% to the national food basket. Crops are grown under rainfed or dryland condition is more than 70% of the cropped areas of Orissa. India contributes 25% of global pulse production, it has to import about 2 million tonnes of pulses every year to meet the domestic demand. The total demand of pulses for the country is estimated at 29.30 million tonnes by 2020 compared to a production of 15.24 million tonnes in 2003-2004 (2). During 2003-2004, in Orissa pulses were grown in 16.43 lakh hectares (6.15 lakh hectares in *kharif*+ 10.28 lakh ha in *rabi*). The productivity during 2003-2004 in Orissa was 379 kg/ha compared to an all India average of 623 kg/ha (3). Total greengram area in Orissa is 611.46 thousand ha and the production is 200.10 thousand tonnes with the yield is 327 kg/ha (4). Nearly 62% of the cultivable land in the state of Orissa is rainfed and depends on monsoon. The farmers in the state grow paddy widely in all situations despite the stress of moisture and low yield. In Eastern India, Kandhamal is a poor tribal district of Orissa, situated under North-Eastern Ghat agro-climatic zone with hot and moist sub-humid climate and red and laterite (Alfisols) soil having low water holding capacity and severe nutrient deficiency. Under such situation, only paddy variety with short duration has grown As a result the fertility level of soil is deteriorating gradually. Organic

manure is the backbone for the sustainability of soil fertility and productivity. Therefore, attempts were made to popularize crop diversity and appropriate management for higher productivity and build up the soil fertility and maintenance of soil health for sustainable production. Keeping these in mind, a field experiment was conducted to study the effect of lime, organic manures such as FYM and *Gliricidia/Cassia* leaves on the yield of greengram-mustard cropping sequence on sustainable basis.

### **Methods**

A field experiment on greengram-mustard cropping sequence was started from 2005 in Dryland Agricultural Research Station (OUAT), Phulbani. The soil of the experimental site was red and laterite (Alfisols). The soil was sandy loam with clay content 14.4%, bulk density 1.63 g cm<sup>-3</sup>, field capacity 13.1%, wilting point 9.5%, pH 5.2, E.C (dsm-I) 0.032, Organic C (g/kg) 3.2, available N (kg/ha) 165, available P<sub>2</sub>O<sub>5</sub> (kg/ha) 20 and available K<sub>2</sub>O (kg/ha) 220. The experiment comprised ten treatment combinations viz. T<sub>1</sub>- No fertilizer (control), T<sub>2</sub>-Lime at 10% of LR, T<sub>3</sub>-Lime at 20% of LR, T<sub>4</sub>-FYM at 5t/ha, T<sub>5</sub>-Lime at 10% of LR + FYM at 5t/ha, T<sub>6</sub>-Lime at 20% of LR + FYM at 5t/ha, T<sub>7</sub>- Greenleaf at 5 t/ha T<sub>8</sub>- Lime at 10% of LR + Greenleaf at 5 t/ha, T<sub>9</sub>-Lime at 20% of LR + Greenleaf at 5t/ha and T<sub>10</sub>-RDF (20 kg N : 40 kg P<sub>2</sub>O<sub>5</sub> : 20kg K<sub>2</sub>O

**Table 1.** Effect of lime, FYM and greenleaf manuring on the yield (q/ha) of greengram.

Treatments	Grain yield of green-gram (q/ha)	Husk yield of green-gram (q/ha)	Persent increase in grain yield over control
T <sub>1</sub> Control	0.89	0.64	—
T <sub>2</sub> Lime 10% LR	2.12	0.94	138
T <sub>3</sub> Lime 20% LR	2.62	1.33	194
T <sub>4</sub> FYM 5 t/ha	1.68	0.84	89
T <sub>5</sub> Lime 10% LR + FYM 5 t/ha	3.06	1.58	244
T <sub>6</sub> Lime 20% LR + FYM 5 t/ha	3.77	1.93	324
T <sub>7</sub> Greenleaf 5t/ha	1.65	0.79	85
T <sub>8</sub> Lime 10% LR + Greenleaf 5t/ha	2.96	1.74	233
T <sub>9</sub> Lime 20% LR +Greenleaf 5t/ha	2.52	1.58	183
T <sub>10</sub> RDF (20 kg N : 40 kg P <sub>2</sub> O <sub>5</sub> : 20kg K <sub>2</sub> O) /ha	2.69	0.96	202
CD ( <i>P</i> = 0.05)	1.52	0.71	—

/ha. Lime and greenleaves were applied one week before sowing and mixed thoroughly with soil. The treatments were tried in randomized block design with three replications. All the treatments were imposed before sowing of greengram crop var PDM 84-139 (Samrat).

### Results and Discussion

The results revealed that all the treatments were superior to control. The highest grain yield of greengram (3.77 q/ha) was recorded in the treatment receiving 5 tones FYM/ha along with 20% lime /ha of lime requirement followed by 3.06 q/ha lime at 10% LR + FYM at 5 tons /ha was applied. Statistically

both were at par with each other (Table 1). The increase in grain yield was in grain yield was in the tunes of 324 and 244% respectively over control. The grain yield of greengram was 2.69q/ha when 10% lime with greenleaf manuring was done. The increase in yield was in the tune of 233% over control, whereas the yield of 2.69 q/ha was recorded in full dose of chemical fertilization. The increase of yield was only 202% over control. It was revealed that organic treatment was better than chemical treatment. The husk yield was increase in the treatment receiving 5 tonnes FYM/ha along with 20% lime /ha of lime requirement. PSM contains 75% of CaCO<sub>3</sub>. Application of PSM at 9 t/ha to the *kharif* dry land crop (green gram) enhanced the yield of green gram by 51% (4). Mishra (5) reported that grain yield of pulses could be substantially increase by furrow application of lime at 1/10th of LR (2- 5 q/ha) in acid soils. Lime (PSM) application at 20% LR below the maize seeds at the time of sowing in addition to normal NPK doses in acid Alfisols. Such a practice gave significantly higher yields of maize. Cob as compared to higher doses of PSM applied by broadcast. Application of low doses of lime mixed with FYM had a beneficial effect on cob yield.

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