

# Amendments and Moisture Regimes on the Transformation of Fe- P in Normal Calcareous Soil of Motipur, Muzaffarpur



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## ABSTRACT

To find the influence of moisture regime on the transformation of applied Fe-P in normal calcareous soil of North Bihar with pyrites.

Experiment was conducted in plastic beakers each containing 500 gm of the representative soil. The soil were fertilize with single super phosphate (SSP) and Diammonium phosphate (DAP) keeping the does of  $P_2O_5$  to tone of 0,40 & 80 Ppm/ha. Pyrites were also added as amendmets keeping the dose of 0, 2, 4 tonnes/ha. Soil was maintained at to moisture levels i.e. field capacity & waterlogged by adjusting the Moisture status.

At every five days internal of water the surface of soil was decanted to create a condition of leaching. During this, calculated quantity of water was added & Soil was mixed throughly. They were weighted immediately and incubated under from temperature in laboratory. After this, calculated water quantity was added on alternate days by finding difference in weights of each beaker. Soil samples were collected at interval 0,20,40 & 60 days. Collected Soil were analysed for phosphorus faction viz. Fe-P. The final result have been find out from analysis.

**Keywords :** Single Super Phosphate, Diammonium Phosphate, Fe-P

## INTRODUCTION

A lot of work on soil and agronomic has been done in past in calcareous and calcareous saline alkali soil, but reclamation studies on calcareous saline alkali soil with the help of organic & inorganic amendmets have recently been initialed.

Several physical & chemical parameters are used for the measuring of physicochemical behaviours on soil of these parts i.e. North & South Bihar However no systematic studies have so far been made to understand the Machanism of fixation and release of various fractions of phosphate in the soil

under different situations likes Moisture regimes amendmets phosphate carriers, time leg etc.

Soil of old Bihar divided into following physiological regions i.e. Alluvial soil of either sides of Ganga, Plateau region of Chhotanagpur. In among these soil composition of materials topography age weathering and vegetation showed differ appreciably. These resulted in the formation of many soil types.

In spite of soil association map of Bihar indicates that it can be divided into 23 board soil associations groups. On the basis of particular chemical substances.

During investigation find out about 80% area of North Bihar is covered with calcareous and calcareous saline alkali soil. Here, There is no denying of the facts that most important nutrients of plant.

The present investigation was started with main objectives of assessing different inorganic bond P like Al-P, Fe-P occluded Al-P and Fe-P with pyrites, as amendments under field capacity and waterlogged conditions. Along with DTPA extractable Fe an Mn available soil P (Olsen's P) were also measured, because it was apprehended that use of pyrites may affects the availability of above elements for great importance in agricultural point of view.

So keeping in view of above facts present work is related to influence of moisture regimes on transformation of applied phosphorus in calcareous soil with pyrites by physico-chemical methods.

Previously, There are no. of work has been done about formation of various form of phosphorus in different soil, fate of added phosphorus in different water regimes and effect of added fertilizers or amendments on release of soil phosphorus. But no systematic work has been done to study the release of phosphates ions in this soil, using different phosphates. carriers under various moisture regimes. So present work is most important for transformation of applied Fe-P in calcareous soil.

## **MATERIALS & METHOD**

(A) Selection of soil :-

Soil samples were collected from 0-15 cm. depth from site Motipur in district Muzaffarpur. Because on the basis of physico-chemical properties Mushahari soil were named as normal calcareous soil. The soil sample was partially air dried

(a) Characteristics of experimental soil :-

parameters	Value of Normal cal carious soil
pH	8.4
EC(mmhos/cm)	0.836
W.H.C	37.18%
F.C	32.27%
CaCO <sub>3</sub>	30%
Texture	Sanday loam
Fe	15ppm
Mn	50 ppm
P <sub>2</sub> O <sub>5</sub>	10 ppm
Fe-P	Nil
Ca-P	330 ppm
Occluded Fe-P	492 ppm

(b) Chemical Characteristics of pyrites : In percentage

Chemicals	Average Percentage
S	16-20%
Fe <sub>2</sub> O <sub>3</sub>	14-18%
MgO	0.1-0.5%
CaO	1.0-5.0%
Al <sub>2</sub> O <sub>3</sub>	8-12%
SiO <sub>2</sub>	45-50%
C	2-5%
Other Micro nutrients.	Traces

(c) Chemical characteristics of phosphate carriers :-

Chemical	Average%
	SSP DAP
P <sub>2</sub> O <sub>5</sub>	16 54
N <sub>2</sub>	- 21

(B) Extraction of Fe-P :-

1 gm soil<sup>n</sup> sample extract with 0.5 N NH<sub>4</sub> F washed twice with 25 ml portion of saturated NaCl sol<sup>n</sup>. It was then extracted with 50 ml of 0.1N NaOH on a rotary shaker at room temp for 17 hours. The soil suspension was centrifuged for 15 minutes at 2400 rpm to obtain a clear supernatant sol<sup>n</sup>. After this extraction with NH<sub>2</sub>SO<sub>4</sub> & conc. H<sub>2</sub>S<sub>4</sub> it was ready for analysis.

(c) Methods for phosphorus determination:-

Chlorostannous Molybdo- Phosphoric blue colour method in Sulphuric acid system:- Fe-P, Ca-P and occluded Fe-P were determined by this Methods:-

(a) Preparation of Reagent :-

(i) Sulphomolybdic acid sol<sup>n</sup> :-

Exactly 25 gm of C.P. (NH<sub>4</sub>) Mo<sub>7</sub>O<sub>24</sub> 4H<sub>2</sub>O was dissolved in 200ml of distilled water at 60°C. The sol<sup>n</sup> was filtered to remove sediment. Then, 250ml of phosphorus free & Arsenic free conc H<sub>2</sub>SO<sub>4</sub> was diluted to 750 ml with distilled water. After cooling ammonium Molybdate sol<sup>n</sup> was added. After this it was diluted with water to exactly 1000ml

**(ii) Chlorostannous Acid reductant :-**

About 25 gm of SnCl<sub>2</sub> 2H<sub>2</sub>O was dissolved in 50ml of conc. HCl with waring. The solution was diluted to 500 ml with boiled distilled water.

**(iii) Development of Molybdophosphoric Blue Colour :-**

The test sol<sup>n</sup> aliquot was placed in 50 ml volumetric flask and then added with sulphomolybdic acid solution & Chlorostannous acid reductant solution then intensity of blue colour was measured & transmission percentage was observed.

**Results & Discussion**

It is clear that under both the moisture regimes i.e. at filed capacity and waterlogged condition Fe-P was not detected up to 20 days incubation of soil but from 40 days onwards detectable amount of Fe-P was recorded. In general, There is decreases in Fe-P with time at filed capacity with & without amendments in case of zero level of P<sub>2</sub>O<sub>5</sub>. Application of pyrites have increased Fe-P as compared to no amendments up to 40 ppm dose of phosphate carriers but at 80 ppm dose there is decreases at 2 tonnes pyrites level followed by increase at 4 tonnes/ha.

At waterlogged condition there is increase in Fe-P without phosphate carriers whether applied with or without amendments with time. At 40 & 80 ppm dose of phosphate carrier, it is interesting to record that is general there is decrease in Fe-P contents of the soil with the application of SSP Under both the conditions i.e. with & without amendments but reverse with DAP.

Variation in fe-P in normal calcareous soil of North Bihar are presented in following table.

Table :- Showing changes in Fe-P (in ppm) under Moisture regime in Normal Calcarious Soil (Motipur- Muzaffarpur)

P Carriers Levels of P <sub>2</sub> O <sub>5</sub> in ppm,	Period of Sampling (in Days)								
		Field capacity				Waterlogged			
		0	20	40	60	0	20	40	60
(A) without Amendments									
SSP	0	-	-	40	31	-	-	71	131
DAP		-	-	42	30	-	-	70	133
SSP	40	-	-	51	91	-	-	101	51
DAP		-	-	77	169	-	-	51	185
SSP	80	-	-	99	121	-	-	168	91

DAP		-	-	100	133	-	-	51	201
(B) With 2 tones pyrite/ha						-	-		
SSP	0	-	-	51	37	-	-	72	162
DAP		-	-	48	37	-	-	75	171
SSP	40	-	-	133	151	-	-	77	61
DAP		-	-	151	233	-	-	87	77
SSP	80	-	-	69	91	-	-	131	89
DAP		-	-	71	89	-	-	121	233
(c)with4 tonnes pyrite/ha									
SSP	0	-	-	71	51	-	-	131	149
DAP		-	-	69	56	-	-	131	152
SSP	40	-	-	137	177	-	-	121	89
DAP		-	-	171	217	-	-	87	133
SSP	80	-	-	77	97	-	-	121	89
DAP		-	-	99	101	-	-	137	191

Thus, we find that waterlogged situation was found to give interesting with and without amendments showing decrease in this parameter with SSP but reverse with DAP. It seems that superphosphate might have reacted favorably with Ca resulting into rise in Ca-P leaving behind inadequate  $PO_4^{3-}$  ions to react with Fe. Thus less amount of Fe-P was recorded. On the other hand, Since DAP contains  $NH_4^+$  ions which might have released  $OH^-$  ions under waterlogged condition inducing release of more quantity of Fe Consequently in increasing Fe-P with time in this case.

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