



MAHARASHTRA RAJYA DRAKSHA BAGAITDAR SANGH

(MAHARASHTRA STATE GRAPE GROWERS' ASSOCIATION)

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No. M.R.D.B.S. / Lab / NT / 164/ of 2009
Pune, Date : 10th July, 2009

To,

Dr. M. Arun Kumar
Director,
BIOCONTROL LABS (P) LTD.
Plot No. 58, H. No. 2 – 28 – 206, 1st Floor,
A.P. Text Book Colony,
Karkhana, Secunderabad – 500 009

Sub : Submission of report on incubation studies.

Ref. : Your letter Dated 13th Nov. 2008.

Sir,

The detailed report on the incubation studies conducted on the two inoculants viz. Phosphogro a Phosphorus solubilizing micro organism and Aurentiagro a potash solubilizing microorganism is inclosed herewith for favour of information and needful action.

Thanks a lot for giving cooperation in conducting these research trials.

With Regards,

Yours Sincerely,

Assistant General Manager

Maharashtra Rajya Draksha Bagaitdar Sangh, Pune – 37.

PROJECT REPORT

On

Bio – efficacy of phosphogro for phosphorous solubilization and Aurentiagro for potash solubilization in soil

Trial Sponsored by

M/s BIOCONTROL LABS (P) LTD.,

1st floor, Plot # 58, 2 – 28 – 206, A.P.

Text Book colony, Karkhana

Secundarabad – 500 009 A. P.

2008 – 09

Trial Conducted by



Maharashtra State Grape Growers' Association,

Draksha Bhavan, E – 4, Market yard,

Pune – 411 037

PROJECT REPORT

Project title : Bio – efficacy of phosphogro for phosphorous solubilization and Aurentiagro for potash solubilization in soil.

Objective :

- i) To Study the efficiency of phosphogro, a bio-Inoculants in solubilizing the phosphorus in soil.
- ii) To study the efficiency of Aurentiagro, a bio – Inoculants in solubilizing the potash in soil.

Conducted by : Maharashtra Rajya Draksh Bagaitdar Sangh, Pune

Project workers :

- 1. Miss Shital R. Zende
Jr. Chemist
- 2. Mrs. Sulakshna S. Ghule
Jr. Chemist
- 3. Mr. Jeevan N. Kalbhor
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- 4. Prof. T.S. Mungare
Lab. Incharge
- 5. Dr. J.M. Khilari
Chairman, MRDBS, Pune

Introduction :

The soil is regarded as a living organism from a biological point of view. A healthy soils depend upon a diverse set of microorganisms. In healthy soil, the microbes population break down the applied chemicals into a diverse group of compounds, which are available to the crops. Reduced soil biological activity will lead to long term degradation of soil structure. To maintain a good soil structure, it is important to maintain good levels of organic matter in the soil and also to maintain soil bacterial and fungal activity. In Maharashtra most of the vineyards are established in calcareous soils. Phosphate fixation is a main problem under such condition. Unavailability of potassium is also a common problem under sodic conditions. Use of bio fertilizers may suggest some solution to overcome these problems. The farmers are now realise the fact and trying to use bio – Inoculants for nitrogen fixation, phosphorus solubilization and potash solubilization in the soil.

Materials and methods :

The incubation studies were conducted in the laboratory using plastic containers having capacity of 4 kg of soil. Three type of soils, a Lateritic soil. Calcareous soil and sodic soils were used for conducting these incubation trials. The details of the soils used and their chemical composition is given in Table 1. Three kg. of soil, passed through 2 mm sieve is then filled in the containers. The organic carbon content of the soil is adjusted to 1.0 per cent by mixing required quantity of well decomposed and sieved farmyard manure. The required quantity of phosphogro and Aurentiagro were added in the soil through irrigation water as per the treatments. The moisture content of the soil was kept at field capacity throughout the period of incubation by adding water as and when required with the help of screw auger, the soil samples were collected at regular interval 15 days. These samples after drying and processing were used for analysis in the laboratory. The available P and K content in the soil was estimated by adopting standard methods. After incubation upto 75 days, the uptake of P and K was determined by growing maize as a test crop. The maize plants were uprooted after 30 days and by giving washing and drying, these plant samples were analysed in the laboratory for estimating the uptake P and K.

Table 1 Initial nutritional composition of the soils

Parameter	Lateritic Soil	Calcareous Soil	Sodic Soil
pH	6.62	9.06	9.63
E.C. (dS / m)	0.04	0.12	0.12
CaCO ₃ (%)	1	18	10
Organic Carbon (%)	0.62	0.51	0.23
Av. Nitrogen (ppm)	160	138	127
Av. Phosphorus (ppm)	2	6	2
Av. Potassium (ppm)	100	95	100
Av. Calcium (ppm)	3825	5700	3275
Av. Magnesium (ppm)	850	1375	1450
Av. Sulphur (ppm)	5.7	2.7	3.4
Av. Iron (ppm)	5.22	0.10	0.56
Av. Manganese (ppm)	21.22	3.12	3.22
Av. Zink (ppm)	0.66	0.5	0.32
Av. Copper (ppm)	1.64	1.66	0.78
Sodium (ppm)	260	590	<u>1140</u>

Treatments

As per the letter dated 13 / 11 / 2008, received from the Director, Bio-control lab (P) ltd, Secunderabad, a dose of 1000 ml./ Ac. Can solubilize 300 kg / ha of phosphorus. Accordingly the treatments were planned. The details of the treatments are as follows.

- T1 : Absolute control
- T2 : Soil + 1000ml / Acre Bio – Inoculants for P and K (Without FYM)
- T3 : Soil + only FYM
- T4 : Soil + FYM + 500 ml / Acre Bio – Inoculants for P and K
- T5 : Soil + FYM + 750 ml. / Acre Bio – Inoculants for P and K
- T6 : Soil + FYM + 1000 ml. / Acre Bio – Inoculants for P and K
- T7 : Soil + FYM + 1250 ml. / Acre Bio – Inoculants for P and K
- T8 : Soil + FYM + 1500 ml. / Acre Bio – Inoculants for P and K

Observations recorded :

1. Initial chemical composition of the three soils used for these studies.
2. Chemical composition of the well decomposed FYM used for adjusting the organic carbon at 1.0 per cent.
3. Available Phosphorous and Potassium in the soil at 15 days interval upto 75 days of incubation.
4. Dry matter weights of harvested maize plants.
5. Nutrient uptake by maize.

Results

The available P and K content during the period of incubation was estimated at regular interval of 15 days. The results obtained for Lateritic, calcareous and sodic soils are given in Table 2, Table 3 and Table 4 respectively. It was revealed from the Table 2 that almost in all the treatments, maximum available P was recorded at 60 days after incubation. The maximum available K was recorded at 75 days in Lateritic soil. In case of calcareous soil, irrespective of the treatment, the availability of P and K was noticed at 60 days after incubation and in sodic soil, optimum release of available K was noticed after 60 days of incubation. The average of P and K content, during the incubation at 15 days interval for three different soils is given in Table 5. In all the three types of soils, it was notice that the application of phosphagro at different levels resulted in gradual increase in available P content. In case of Lateritic soil the average available P in absolute control (T1) was 3.81 ppm and was found to increase the availability by using phosphagro upto 6.20 ppm in T8 (62.73 %). In case of calcareous soil, the increase was found to be from 7.33 ppm to 16.40 ppm (T4). The increase over absolute control was found to be to the tune of 123.74 per cent. Indicating there by the usefulness of phosphagro to increase the P availability, where the phosphate fixation is a main problem in calcareous soils. The performance of phosphagro was noticed in sodic soils also. The increase in available from P (5.67ppm) (T1) to 10.07 ppm (T5). The increase was found to be 77.60 per cent over control.

The performance of Aurentigro, a potash solublizing bio-Inoculants was applied at different quanties also found to be beneficial to increase the availability of K in all the three soils. In Lateritic soil the available K in absolute control treatment was 182.33 ppm. The highest increase 227.00 ppm was noticed in T5 and the increase was found to be 24.50 per cent over control. In case of calcareous soil the available average K was 210.33 ppm. Due to application Aurentiagro @ 500 ml / Acre, along with FYM (T4) the availability of K increased upto 256.67 ppm, and it was 22.03 per cent more than the absolute control. As regards the sodic soils are concerned, the same bio – inoculants was

found to increase the K availability from 206.67 ppm (T1) to 258.67 ppm in T4 and the per cent increase was found to be 25.16 per cent. In sodic soil, the availability of K is a problem. However, this K solublizing bio inoculants was found to be beneficial.

The Performance of both these Bio-Inoculants was found to be depend on organic carbon content in the soil. in treatment T1 (Absolute control), T2 (Bio – Inoculants without FYM) clearly indicates the dependence of these bio - inoculants on level of organic matter in the soil.

Table 2. Available P and K at regular interval at 15 days during incubation in Lateritic Soil

Treatment	Available P (ppm)						Available K (ppm)					
	15	30	45	60	75	Mean	15	30	45	60	75	Mean
T – 1	2.07	3.00	5.33	5.67	3.00	3.81	183.33	190.00	168.33	190.00	180.00	182.33
T – 2	2.67	2.67	5.33	6.33	2.67	3.93	190.00	215.00	175.00	185.00	191.67	191.33
T – 3	2.00	4.00	7.00	5.67	4.00	4.53	220.00	226.67	200.00	220.00	210.00	215.33
T – 4	2.00	5.33	6.00	6.67	6.00	5.20	213.33	235.00	201.67	241.67	211.67	220.67
T – 5	3.00	3.33	8.67	6.33	5.33	5.33	240.00	240.00	200.00	221.67	233.33	227.00
T – 6	3.00	5.33	7.00	7.67	7.00	6.00	216.67	231.67	201.67	216.67	235.00	220.34
T – 7	2.33	5.00	6.67	8.00	7.00	5.80	196.67	230.00	205.00	225.00	230.00	217.33
T – 8	2.00	6.00	7.67	7.67	7.67	6.20	216.67	221.67	201.67	213.33	216.67	214.00
SE ±	0.27	0.43	0.67	0.76	0.43		5.68	6.25	5.00	6.39	4.02	
CD at 5 %	0.80	1.29	2.00	2.27	1.30		17.04	18.76	15.00	19.17	12.07	

Table 3. Available P and K at regular interval at 15 days during incubation in Calcareous Soil

Treatment	Available P (ppm)						Available K (ppm)					
	15	30	45	60	75	Mean	15	30	45	60	75	Mean
T – 1	7.00	6.33	7.67	8.67	7.00	7.33	156.67	210.00	208.33	245.00	231.67	210.33
T – 2	11.00	6.67	8.00	9.33	7.33	8.47	180.00	206.67	211.67	236.67	231.67	213.34
T – 3	13.00	9.67	12.67	14.67	9.00	11.80	226.67	233.33	263.33	275.00	253.33	250.33
T – 4	17.33	12.00	18.67	17.33	16.67	16.40	240.00	236.67	225.00	310.00	271.67	256.67
T – 5	17.00	11.67	17.00	16.33	15.33	15.47	226.67	240.00	206.67	298.33	250.00	244.33
T – 6	13.33	9.33	14.67	15.33	15.67	13.67	206.67	243.33	228.33	285.00	278.33	248.33
T – 7	12.33	11.67	13.67	15.33	12.00	13.00	193.33	236.67	230.00	271.67	240.00	234.33
T – 8	16.00	11.67	17.33	16.33	16.33	15.53	230.00	256.67	250.00	290.00	261.67	257.67
SE ±	0.71	0.49	0.69	1.08	0.49		6.90	6.51	6.61	4.84	4.79	
CD at 5 %	2.13	1.47	2.06	3.23	1.46		20.71	19.53	19.82	14.51	14.36	

**Table 4. Available P and K at regular interval at 15 days during
incubation in Sodic Soil**

Treatment	Available P (ppm)						Available K (ppm)					
	15	30	45	60	75	Mean	15	30	45	60	75	Mean
T-1	9.67	7.67	5.33	2.00	3.67	5.67	186.67	203.33	211.67	241.67	190.00	206.67
T-2	8.00	5.00	10.67	3.67	6.33	6.73	188.33	196.67	215.00	215.00	218.33	206.67
T-3	17.33	8.00	9.67	5.33	7.33	9.53	240.00	231.67	260.00	278.33	238.33	249.67
T-4	14.67	9.00	10.00	4.33	7.00	9.00	250.00	251.67	245.00	281.67	265.00	258.67
T-5	17.00	8.00	13.00	5.33	7.00	10.07	240.00	256.67	250.00	280.00	250.00	255.33
T-6	15.33	8.67	11.67	5.00	8.00	9.73	246.67	248.33	238.33	261.67	235.00	246.00
T-7	14.67	7.67	9.00	6.67	7.67	9.14	250.00	253.33	250.00	266.67	260.00	256.00
T-8	14.33	7.67	8.00	9.33	9.00	9.67	213.33	261.67	226.67	270.00	286.67	251.67
SE \pm	0.62	0.64	0.73	0.43	0.31		4.93	7.16	4.16	6.01	4.44	
CD at 5 %	1.86	1.91	2.20	1.30	0.93		14.79	21.48	12.48	18.03	13.33	

**Table 5. Average available P and K (ppm) in the soil during incubation
for 75 days**

Treatment	Lateritic Soil		Calcareous Soil		Sodic Soil	
	P	K	P	K	P	K
T1	3.81	182.33	7.33	210.33	5.67	206.67
T2	3.93 (3.15)	191.33 (4.94)	8.47 (15.55)	213.34 (1.43)	6.73 (18.69)	206.67 (0)
T3	4.53 (18.89)	215.33 (13.16)	11.80 (60.98)	250.33 (19.01)	9.53 (68.08)	249.67 (20.80)
T4	5.20 (36.48)	220.67 (21.02)	16.40 (123.74)	256.67 (22.03)	9.00 (58.33)	258.67 (25.16)
T5	5.33 (39.89)	227.00 (24.50)	15.47 (111.05)	244.33 (16.17)	10.07 (77.60)	255.33 (23.54)
T6	6.00 (57.48)	220.34 (20.84)	13.67 (86.49)	248.33 (18.06)	9.73 (71.60)	246.00 (19.03)
T7	5.80 (52.23)	217.33 (19.20)	13.00 (77.35)	234.33 (11.41)	9.14 (61.20)	256.00 (23.86)
T8	6.20 (62.73)	214.00 (17.36)	15.53 (111.86)	257.67 (22.50)	9.67 (70.54)	251.67 (21.77)

(NB: Figure in parenthesis indicate the per cent increase over control)

Table 6. Effect of Bio-Inoculants on Uptake of nutrients (mg / plant)

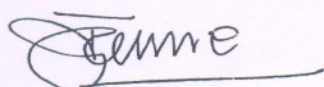
Treatment	Lateritic Soil		Calcareous Soil		Sodic Soil	
	P	K	P	K	P	K
T1	0.35	19.26	1.25	19.40	0.42	3.75
T2	0.82	24.30	1.35	21.43	0.80	9.22
T3	1.11	30.70	4.83	58.41	1.55	20.90
T4	1.27	40.28	6.84	87.76	1.78	35.56
T5	0.96	33.20	3.77	82.62	3.36	33.61
T6	1.08	39.83	3.35	68.62	1.64	21.76
T7	1.16	33.81	3.24	74.56	2.23	32.06
T8	0.99	28.63	2.53	56.51	1.34	10.96

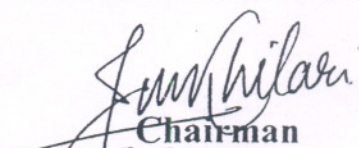
Uptake of Nutrients

After completion of the incubation of 75 days, a maize plants were grown in these containers and studied the uptake of P and K (Table 6). In case of Lateritic soils, the uptake of P was found to increase from 0.35 mg/plant (T1) to 1.27 mg/plant in T 4. The same trend was noticed in K uptake also. In calcareous soil the uptake of P in T 1 was 1.25 mg/plant and it was increased upto 6.84 mg/plant in T 4. The increase of uptake of P was tune of 447 per cent over control. Same trend of increase was also noticed in K uptake also. In sodic soils also the uptake of P and K increased significantly in T 5 as compaired with other treatments.

Inferences

It can be concluded from these studies that the use of Phosphagro, a Phosphorous solublizing bio – inoculants and Aurentiagro, a potash solublizing bio – inoculants are useful in increasing the availability of P and K from the soil and also resulted to increase the uptake of P and K by the plants. However, it is felt that the incubation studies only indicates the trend. The final conclusion can only be drawn by conducting the trials in the field at least for two seasons at different gradients of organic carbon content in the soil.


Lab. Incharge
(M.R.D.B.S.)


Chairman
(M.R.D.B.S.)