PD-AAW-677

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

DATE: 9/10

MEMORANDUM

TO: AID/PPC/CDIE/DI, room 209 SA-18

FROM: AID/SCI, Victoria Ose VO

SUBJECT: Transmittal of AID/SCI Progress Report(s)

Attached for permanent retention/proper disposition is the following:

AID/SCI Progress Report No. 2.A-04

Attachment
1 copy each
PR #4
#5
#6

PD-AAW-677

2.A-04

THE ROLE OF VA MYCORRHIZAE IN PHOSPHORUS NUTRITION OF ECONOMIC LEGUMINOUS CROPS

(AID PROJECT NUMBER)
936 - 5542

SIX MONTHLY REPORT TO USAID

NO. 4

PERIOD 1.1.85 - 30-6-85

Rec'd in SCI JUL 17 1985

Project Tittle : The Role of VA Mycorrhizae in Phosphorus Nutrition of Economic Leguminous Crops.

AID Project Number: 936 - 5542

Amount of AID Grant: $ 160,000

Project Assistant Completion Date: September 30, 1986.

Agreement Between : USAID and Department of Agriculture

1. Activities in the Project:

1.1 Employment of Technician

- One technician has been hired since October 1983
- One more technician has been hired since January 1985

1.2 Procurement

Two items which had been approved from USAID to purchase from the left over procurement budget in this period are

1.2.1 One Blender

1.2.2 Two air conditioner

1.2.3 One Dehumidifier

The dehumidifier is on the process of purchasing.

1.3 Research Activities

1.3.1 Pot culture multiplication for mycorrhizal species.

Single spores selection which were done in pot culture using Menge pot culture technique were identified. Some doubted species has to be making more single spore because of contamination in some pot and some did not produce spores or produce only few spores which is not enough for identification. Fourteen species which was identified as shown in the first report. Acaulospora morrowae and Acaulospora laevis were found abundant in all location. After making pot culture for multiplication, the highest number of spores were obtained from Acaulospora scrobiculata. The least number obtained from pot culture was Gigaspora species. Observation on

the spores producrtion evidence should be further study because Gigaspora species population in the pot seem to be getting higher with time. Some other species which are not reported were found and also making pot culture for multiplication. Tweleve species which produced enough spores in pot culture for further experiment are shown in table 1.

For the percent root colonization in the weeds found in the rice paddy field as shown in table 2, Heliotropium indicum Linn. had highest percent VA mycorrhizal root colonization. The second was Eriochloa procera. Dichanthium caricosum had the least VA mycorrhizal root colonization.

1.3.2 Effect of VA Mycorrhizal Fungi on Phosphorus Absorbtion and Growth of Soybeans and Mungbeans.

Glasshouse study:

Twelve species of VA mycorrhizal fungi collected from pot culture as shown in table 1 were inoculated to soybeans S.J.5 and mungbeans cultivar U-Thong 1. The inoculated plants were grown in pots containing 100 spores of individual species. Each pots was applied with nitrogen fertilizer at the rate 18.75 kg N/ha. The experiment was employed in Randomized Complete Block Design with 6 replications, 13 treatments including control.

The results in Table 3,4,5,6 and 7 showed that soybeans inoculated with Entrophospora # 8 and Glomus # 17 obtained the best growth on height and higher than control 10 %. Soybeans inoculated with MOS 156 # 6 obtained the highest dry weight and higher than control 30 %. Spybeans inoculated with INT 183 # 26 and MAR 103 # 40 obtained the highest pod dry weight, higher than control 200 %, these two species also gave the highest soybeans root colonization.

The results in table 8,9,10,11 and 12 showed that mungbeans inoculated by MAR 103 # 40 got the highest height and higher than control 10%. Mungbeans inoculated with MAR 103#40 and INT 183 # 26 got the highest dry weight and above control about 35 %. Mungbeans inoculated with MOS, Glomus # 17 MAR 103#40 got the highest dry pod yield higher than control 51,40,37 % consequently, these species also gave the highest mungbeans root colonization.

These results were the average means different interpretation, The results in statistics, analysis of variance will be in the next report. More experiment will be done on comparison the effectiveness of other VA mycorrhizal fungi found from paddy field.

Field study:

Twelve species which were will sporulated and have enough spores to use as inoculum had been selected to study their

effectiveness on soybeans and mungbeans in the field. Three different locations were conducted at Prajienburi province for Central and at Kalasin for North eastern province and North at Chiengmai province. Soybeans and Mungbeans were grown at Prajienburi.Mungbeans and Peanuts were grown at Kalasin and Soybeans and peanuts were grown at Chiengmai. All the data such as height, weight, percent root colonization, number of spores in soil had been recorded in every 30 days., inculding yield when harvesting. All the details, data and the result in statistics will be shawn in the next report after all the collected data has been analized.

1.4. Situation of the project development.

There are seven species of collected V.A. mycorrihizal fungi that sporulated well so that sufficient spores could be obtained to use as the inoculum for glass-house and field experiment. The glasshouse which was removation now has been finished. The mycorrhizal fungi pot culture which were carried on in the glasshouse and has to delay and got some problems which glasshouse was remodel now has been reset . So hopefully more spores of new species could be obtained from pot culture.

One more technician has been hired because more work in laboratory after the samples both in the glasshouse and in the field were examined for percent root colonization. The part of examine the root colonization and counting the number of spores found in the experimented soils consuming a lot of time and manpower. The data could not interpreted yet because of these steps of work.

The data and the results could be obtained in the next report.

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Certified corrected: Y. Vasuvat

(Mrs. Yenchai Vasuvat)

Principal investigator

Table 1. List of VA mycorrhizal species which were well sporulate in pot culture.

listed no.	species	no.of spores/100 g. so
1.	*Acaulospora scrobiculata* (ASCR)	4200
2.	*Glomus intraradices* 183#26 (INT)	250
3.	*Glomus mosseae* (MOS)	1400
4.	*Glomus* sp. # 17	1200
5.	*Glomus mosseae* 156 # 6 (MOS)	1450
6.	*Glomus deserticola* 160 # 39 (DES)	840
7.	*Glomus etunicatum* 157 # 31 (ETU)	2000
8.	*Gigaspora magarita* 103 # 40 (MAR)	134
9.	*Gigaspora gregaria* 116 # 33 (GRE)	123
10.	*Gigaspora* sp. 011 # 57 (GRE)	115
11.	*Entrophospora* sp. # 8 (ENTRO)	115
12.	*Gigaspora* sp. # 56 (GI 002)	175

Table 2. Percent weeds root colonization found in the rice paddy field.

	percent root colonization
Mimosa pudica Linn	10 %
Echinochoa colonum(Linn) Link	12 %
Scoparia dulcis Linn	9 %
Chrozaphora rottleri	9 %
Hedyotis diffusa Roxb	7 %
Phyllanthis virgatus Forst. f.	5 %
Sporoblus virgineus Linn	4 %
Euphobia hirta Linn	3 %
Euphobia hyerricifolia Linn	2 %
Physalis minima Linn	4 %
Eriochloa procera (Retz) C.E. Hubbard	12 %
Heliotropium indicum Linn	15 %
Dichanthium caricosum Linn	1 %

Table 3. Average soybeans height inoculated with VA mycorrhizal species in glasshouse.

Height / species	Height (cm)		
	30 days	60 days	100 days
RIU 157 # 31	21.82	28.91	28.80
DRS 160 # 39	21.10	29.13	28.95
MAR 103 # 40	22.31	29.91	28.35
ENTRO # 8	28.16	28.49	30.66
GRE 001 # 57	18.44	25.24	24.65
Gi 002 # 56	20.99	28.49	27.57
ASCR # 22	18.48	26.24	27.00
MOS 156 # 6	22.39	29.91	30.00
INT 183 # 26	19.37	27.49	27.60
MOS	19.15	27.66	27.94
Glomus # 17	23.47	29.58	29.25
GRE 116 # 33	21.78	29.00	28.94
Control	20.11	26.57	26.77

Table 4. Average soybeans shoot dry weight when inoculated with VA mycorrhizal species in glasshouse

Species Weight	Weight (gram)		
	30 days	60 days	100 days
ETU 157 # 31	0.16	0.91	0.98
DES 160 # 39	0.13	0.83	1.35
MAR 103 # 40	0.22	0.98	1.13
GRE 116 # 33	0.16	0.92	1.13
ENTRO # 8	0.21	0.74	1.08
GRE 001 # 57	0.12	0.64	1.08
Gi 002 # 56	0.11	0.87	1.22
ASCR # 22	1.17	0.64	1.00
HOS 156 # 6	0.26	0.95	1.65
INT 153 # 28	0.14	0.89	1.45
MOS	0.23	0.92	1.20
Glomus # 17	0.18	0.95	1.18
Control	0.21	0.93	1.15

Table 5. Average soybeans pods when inoculated with VA Mycorrhizal species grown in glasshouse.

Species	Weight	Weight (gram/pl)	
		fresh pod	dry pod
ETU 157 # 31		0.29	0.16
DES 160 # 39		0.90	0.38
MAR 103 # 40		1.14	0.49
GRE 116 # 33		0.35	0.17
ENTRO # 8		0.58	0.32
GRE 001 # 57		0.55	0.27
Gi 002 # 56		0.63	0.34
INT 183 # 26		1.29	0.50
MOS		0.65	0.38
Glomus # 17		0.95	0.44
Control		0.38	0.20

Table 6. Percent soybeans root colonizations when inoculated with species of VA mycorrhizal fungi

Species	% root colonization		
ETU 157 # 31	7.2	2	24
D&S 160 # 39	0	24	72
MAR 103 # 40	0	48	73
GRE 116 # 33	0.5	0	9
ENTRO # 8	4.0	3	23
GRE 001 # 57	15.0	2	10
Gi 002 # 56	15.0	11	30
ASCR # 22	3.1	54	0
MOS 156 # 6	23	74	0
INT 183 # 26	60	90	98
MOS	2.5	17	31
Glomus # 17	0.2	1	36
Control	0	0	1

Table 7. Number of spores VA mycorrhizal species in soils when grown inoculated soybeans.

Species	Number of spores / 100 gm soil	
	60 days	100 days
ETU # 31	3	38
DES # 39	292	443
MAR 103 # 40	0	128
CRE 116 # 33	3	15
ENTRO # 8	16	518
CRE 001 # 57	1	7
Gi 001 # 56	2	40
ASCR # 22	-	1837
MOS 156 # 6	-	282
INT 183 # 26	4	207
MOS	13	155
Glomus # 17	80	5
Control	-	-

Table 8. Average mungbeans height when inoculated with VA mycorrhizal species in glasshouse.

Species Height	Height (cm)		
	30 days	60 days	100 days
ETU 157 # 31	17.30	20.53	22.40
DES 160 # 39	15.71	18.19	20.05
MAR 103 # 40	18.08	21.51	23.72
GRE 116 # 33	16.82	18.18	20.18
ENTRO # 8	15.99	19.49	21.64
GRE 001 # 57	16.92	19.45	21.66
Gi 002 # 56	16.38	18.99	21.00
ASCR # 22	17.12	21.48	23.65
MOS 156 # 6	17.01	20.66	22.45
INT 183 # 26	17.76	21.19	22.98
MOS	16.32	19.49	21.70
Glomus # 17	15.98	18.64	20.31
Control	16.75	19.69	21.83

Table 9. Average mungbean shoot dry weight when inoculated with VA mycorrhizal species in glasshouse.

Species Weight	dry weitht (gm/pl)		
	30 days	60 days	100 days
ETU 157 # 31	0.16	0.30	0.53
DES 160 # 39	0.16	0.30	0.42
MAR 103 # 40	0.20	0.33	0.66
GRE 116 # 33	0.16	0.17	0.49
ENTRO # 8	0.10	0.41	0.44
GRE 001 # 57	0.24	0.39	0.52
Gi 002 # 56	0.19	0.31	0.57
ASCR # 22	0.18	0.46	0.55
MOS 156 # 6	0.17	0.42	0.59
INT 133 # 26	0.20	0.38	0.62
MOS	0.13	0.40	0.49
Glomus # 17	0.14	0.36	0.42
Control	0.15	0.21	0.43

Table 10. Average mungbeans pods when inoculated with VA Mycorrhizal species grown in glasshouse.

Species \ Weight	Pod weight (gm)	
	fresh pods	dry pods
ETU 157 # 31	0.78	0.37
DES 100 # 39	0.62	0.17
MAR 103 # 40	1.21	0.60
GRE 115 # 33	0.70	0.26
ENTRO # 8	0.73	0.27
GRE 001 # 57	0.68	0.22
ASCR # 22	1.02	0.56
MOS 156 # 6	0.73	0.33
INT 103 # 26	0.70	0.30
MOS	1.04	0.77
Glomus # 17	1.35	0.64
Control	0.80	0.36

Table 11. Percent mungbeans root colonization when inoculated with species VA mycorrhizal fungi

Species	percent root colonization	
	60 days	100 days
STU 157 # 31	13	50
DES 160 # 39	45	74
MAR 103 # 40	35	97
GRM 116 # 33	1	16
ENTRO # 8	24	84
GAE 001 # 57	11	68
Gi 002 # 56	3	14
ASCR # 22	20	70
MOS 156 # 6	54	68
INT 183 # 26	65	98
MOS .	9	88
Glomus # 17	21	49
Control	0	19

Table 12. Number of spores VA Mycorrhizal species in soils when grown inoculated mungbeans.

Species	No of spores / 100 gm. soil	
	60 days	100 days
EPU 157 # 31	88	92
DES 160 # 39	169	2150
MAR 103 # 40	5	37
GRI 116 # 33	2	15
ENTRO # 8	5	4
GRI 001 # 57	1	15
Gi 002 # 56	4	40
ASCR # 22	193	1005
MOS 156 # 6	34	213
INT 183 # 26	28	96
MOS	55	182
Glomus # 17	296	360
Control	0	0