

特許品 願中

驚異のパワー

収穫力

農産物・植物の液体活力剤

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土壌活性化剤「収穫力」は海の魚・海藻を原料とし、有効バクテリア・酵素で発酵分解して製造され、ビタミン、ミネラル、各種アミノ酸を多く含んでいますので水通水で希釈して何度か散布すると土壌バランスが良くなり、固結した土壌は団粒化して柔らかくなるので作物の根は良く伸び、土壌内の酸素量は増え、通気・通水が良くなります。更に、人間にも地球にも優しく安全無害です。

CACAO (THEOBROMA) SHUKAKU RIKI AS
 BIO FERTILIZER/MICROBIAL INOCULANT
SHUKAKU RIKI
“POWER HARVEST”

RATIONALE

CACAO tree (*Theobroma*) considered as the major crops producing here in the Philippines. And Davao City was recognized as the capital producing Cacao in the Philippines. Also, recent years Davao also mark its name in the field of best quality as awarded in Europe.

The most common diseases that affect the production of Cacao trees are VSD or Vascular Streak Die back (*Oncobasidium theobromae*) a group of fungi that primarily attacked on young shoots where rain flash disperses the spore. And eventually, this Cacao trees may die if control measures had not taking it seriously. The effect will systematically run thru primary branches down to the jorquette where fruits also affected by showing brownish streaks in color. Seeds are poorly developed.

While, in nature there are many soils borne microorganisms that also become antagonistic other pathogens. Bacterial species has become biological control agents that has antagonistic approach to most of species of fungi. The family of *Bacillus* species has been long before discover as Biocontrol against harmful microorganism soil burned diseases.

In modern times, most approached in controlling of some diseases using synthetic methods create extreme degradation our soil and our environment due excessive used chemicals. But then, its none to be promising result. The use of Bio organism has become interesting.

OBJECTIVE

- ❖ The study is aim to provide the promising result and acquiring new approach to control the soil borne diseases. The desires to established the fundamental and scientific result as demonstrating the effect of Bio organisms using the SHUKAKU RIKI in the field of biological control aspect.
- ❖ Be able to determined and evaluate the performance of SHUKAKU RIKI as Bio inoculants against incidence of Vascular Streak Dieback and other related disease fungus.
- ❖ To established and create comparative studies affecting the performance of host plants response using the biological approach treatment thru spraying and drenching methods.
- ❖ Be able to provide further long-term study that attributes various factors considering the life cycle of the disease (*Oncobasidium theobromae*) affecting the treatment performance in respond to inhibitory factor of Bio Control in the growth of pathogens in the plant system.
- ❖ And be able to meet the performance of the trial that provide the concrete future reference, treatments and to develop potential biological control as long term preventive measures of the disease.
- ❖ And it aims and expand the importance of biological control to suppressed the disease by protecting our nature, restoring the soil where essential microorganisms exist.
- ❖ While to reduce the use of synthetic fertilizer material which aim to provide economic approach in term of costs and increase productivity'.

SCOPE AND LIMITATION OF THE TRIAL

- This trial will be limited only for Vascular Streak Dieback of Cacao, some fungal diseases and Nutritional approach as Bio organic based product. Using the different methods/ treatments and rates as basis of the trial.
- This will be a 3 – 6 months as minimum period required to commence the trial on the basis of acquiring data particularly on drenching applications for non-infected Cacao trees.

SITE SELECTIONS

The sites are selected based on different approach. For established area that infestation of Vascular Streak Dieback (VSD) disease is presence and non VSD infestation area (Healthy Trees).

TYPE OF PHASES TREATMENT FOR CACAO TREES

1. **Nursery** – Preventive approach against VSD occurrence while in young stage
2. **At Planting** – Newly open area.
3. **Established area** – Sporadic cases of Vascular Streak Dieback (VSD) infestation in certain area.

EXPERIMENTAL DESIGNED

Nursery

A selected nursery site where preventive approach of Shukaku Riki as regular maintenance using spray methods. The area is separated in two ways: Treatment 1- Treated with Shukaku and Treatment 2 – Control. Each treatment should at least 150 – 200 seedlings or it depends on availability of seedling stocks at the nursery.

At planting

A comparative experimental treatment of Shukaku Riki using blanket/mat to mat drenching/basal procedures. The Plot area measures at least 0.25 has to 0.5 has with representing two selected sites. T1 – Treated with Shukaku Riki and T2- Control.

Established area (Existing Farm/area with healthy trees)

A randomized experimental plot design on a specific area where the whole plot with healthy Cacao trees for preventive/maintenance approach. Survey will be the basis to plot the trial/treatment. The plot will measure ranging from 0.5 hectare to 1.0 hectare depending on disease survey therein and be divided into two (2) treatment such as : T1 – Treated with Shukaku Riki and T2-Control.

Established area (Existing Farm/area with VSD infestation)

A randomized experimental plot design on a specific area where Vascular Streak Die Back of Cacao (VSD). A diseased Survey will be the basis to plot the trial/treatment. Trial plot will measure ranging from 0.5 hectare to 1.0 hectare depending on disease survey therein.

PROCEDURES

SHUKAKU RIKI is a liquid form of Bio fertilizer that easily incorporate during preparation. Recommended Mixing rate require at 10 -15 ml pure **SHUKAKU RIKI** solution in every 1 liter of water.

APPLICATIONS

In drenching

Using sprayer can fill it with desired volume of mix solution and spray/drench around the base of the plant at least 60 – 70 centimeter or 2.5 feet radius. The solutions evenly spread completely covered the entire space around the plant at optimum delivery of solution for non-infected Cacao tree and those suspected disease such as cause by Fungus (*Oncobasidium Theobroma*) Vascular Streak Die Back of Cacao. (Please see attached recommended rate tabulation.)

In Foliar spraying

Using sprayer can fill it with desired volume of mix solution and spray from top of Cacao tree targeting the shoots /upper younger leaves of the plant by performing circular movement surround the tree by uniformly hit the entire leaves and branches start from upper to lower branches. (Please see attached recommended rate tabulation.)

NUTRITIONAL APPROACH - We strongly considered and as recommended **SHUKAKU RIKI** as Bio Fertilizer and as soil activator. In this event, this approach is vital basis for nutrient supplemental and aims to reduce the use of synthetic (Fertilizer) at 50 % in total cropping requirement (fertilizer. Program). This will ease / reduce the material cost in Cacao Farm respectively.

PATHOLOGICAL APPROACH - The presence Bio organism as major component of Shukaku Riki become the inhibitor to all types soil borne diseases. These essential organisms provide a broad expectrum to protect the plant from any attack such as soilborne diseases during early growth or even on the matured age of the plant.

MIXING PROCEDURES

- 🔧 Prepare empty containers @ 60 liters volume capacity where pure solutions and water can be mix. At the recommended rate mention above.
- 🔧 There should be enough empty containers for convenient rotations and distribution of stocks solution during treatment activities.
- 🔧 Always required to conduct a water PH analysis in every water solution used to determine if the water source has a good PH level as for reference during the actual mixing made.
- 🔧 Calibrate the pure solutions in accordance with the above mention recommendation rate and properly mix into prepare empty container that filled with water.
- 🔧 Please note always agitate thoroughly the pure solution prior or before mixing or incorporate in prepared water in the container and same with the prepare solutions must also agitate as well before in every application made.
- 🔧 Apply the prepare solutions on the desired area of plants/cases.

RESTRICTIONS:

- Please refrain from using of chlorinated water as mixing solutions for us to avoid unnecessary problem when it regards to Bio organism performance. This may disintegrate their structural /physical formation as they are in a form of cell structures. But nevertheless, they can stand /tolerate chemical toxicities as unique family of bacteria that had especial characteristics among bacterial species in nature.
- Containers where pure solutions inside must keep in cool and safe place and avoid excessive expose in open sunlight. Must keep the cover cap close tightly before and after used.

PEST AND DISEASE MANAGEMENT

A. PEST AND DISEASE MONITORING

1. Early monitoring or identifying the Pest and Diseases of Cacao trees could make a big help to control the spread and becoming major constrain in the end.
2. Proper timing application of such control also contribute of good effect to minimize the infestation.

DATA GATHERING

A. AGRONOMIC DATA (Nutritional data)

1. Fruit weight
2. Pod's length
3. Total pods production per harvest

B. PATHOLOGICAL DATA TO BE GATHERED

1. Percentage (%) incidence of VSD or Vascular Streak Die back (*Oncobasidium thebromae*) from 0 week to 48 weeks for comparative treatment performance and Bio efficacy of SHUKAKU RIKI as biological control.
2. Severity reading of Vascular Streak Dieback incidence at younger plants up to shooting as for Bio efficacy of SHUKAKU RIKI on weekly basis data collection. Note: This is for newly planted Cacao trees.

Here under severity of disease will be evaluated on an arbitrary scale of 0 - 4 where:

- 0 - Healthy
- 1 - Symptoms on the leaves, twigs, and tertiary branches.
- 2 - Symptoms on the secondary branches
- 3 - Symptoms on the primary branches
- 4 - Symptoms on the jorquette and trunk

Disease index will be further computed by using the formula below:

$$DI = \frac{0N_0 + N_1 + N_2 + N_3 + N_4 + N_5}{5H} \times 100$$

Where:

- N_0 = are the number of samples with the rating of 0,1,2,3, and 4 respectively
- N = is the total number of rated samples
- 5 = refers to the highest severity of infection

THE EFFICACY OF BIO INOCULANT WILL BE BASED ON THE FOLLOWING CRITERIA:

DI (%)	Efficacy of rating
0 -11	very effective
12-22	effective
23-33	less effective
33 -above	not effective

TABLE 1. SHUKAKU RIKI RECOMMENDED RATE TABULATION GUIDE FOR CACAO TREE (Theobromae) AT 3,200 POP.UNIT/HILL

PHASE/TYPE	METHOD/APPLICATION	TREATMENT	RATE ML/WATER	DAYS GAP/INTERVAL	NO. CYCLES/FREQUENCY	DELIVERY OF SOLUTION
AT NURSEY	FOLIAR SPRAYING	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	10 ML/SHUKAKU RIKI	15	6	50 ML SOLUTION/HILL
AT PLANTING	DRENCHING/HOLE BASAL/RADIUS	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	10 ML/SHUKAKU RIKI	30	6	400 ML SOLUTION/HILL
ESTABLISH AREA NON-INFECTED/MAINTENANCE	DRENCHING/PLANT TREE RADIUS	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	10 ML/SHUKAKU RIKI	60	6	1.5 LITERS SOLUTION/PLANT
ESTABLISH AREA INFECTED CACAO TREES TREATMENT	DRENCHING/PLANT TREE RADIUS	BIO ORGANISM/FERTILIZER SOIL ACTIVATOR/INHIBITOR	15 ML/SHUKAKU RIKI	30	3	1.5 LITERS SOLUTION/CASE PLANT
ESTABLISHED AREA INFECTED CACAO TREES	FOLIAR SPRAYING	BIO ORGANISM/FERTILIZER SOIL ACTIVATOR/INHIBITOR	15 ML/SHUKAKU RIKI	15	6	1.0 LITER SOLUTION/HILL
ESTABLISHED AREA HEALTHY CACAO TREES	FOLIAR SPRAYING	BIO ORGANISM/FERTILIZER SOIL ACTIVATOR/INHIBITOR	5 ML/SHUKAKU RIKI	30	6	1.0 LITER SOLUTION/HILL

TABLE 1. COST ANALYSIS OF DIFERENT APPROACH TABULATION IN CACAO VSD TREATMENT AT GIVEN 3,200 HILLS/HAS.

PHASE/TYPE	METHOD/APPLICATION	CYCLE/FREQUENCY/APPLICATION	TREATMENT	RATE ML/WATER	PRICE PER LITER	TOTAL VOLUME LTRS	DELIVERY OF SOLUTION	COSTS PER APPLICATION/CYCLE	COST PER HILL/APPLICATION
AT NURSEY	FOLIAR SPRAYING	6	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	10 ML/SHUKAKURIKI	850.00	9.6	50 ML SOLUTION/HILL	2,720.00	0.85
AT PLANTING	DRENCHING/HOLE BASAL/RADIUS	6	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	10 ML/SHUKAKURIKI	850.00	76.8 L	400 ML SOLUTION/HILL	10,880.00	3.40
ESTABLISH AREA NON-INFECTED/MAINTENANCE	DRENCHING/PLANT TREE RADIUS	6	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	7 ML/SHUKAKURIKI	850.00	134.4 L	1.0 LITER SOLUTION/PLANT	19,040.00	5.95
ESTABLISH AREA INFECTED CACAO TREES TREATMENT	DRENCHING/PLANT TREE RADIUS	3	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	10 ML/SHUKAKURIKI	850.00	96 L	1.0 LITER SOLUTION/CASE PLANT	27,200.00	8.50
ESTABLISHED AREA INFECTED CACAO TREES	FOLIAR SPRAYING	6	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	10 ML/SHUKAKURIKI	850.00	153 L	800 ML SOLUTION/HILL	43,350.00	13.5
ESTABLISHED AREA HEALTHY CACAO TREES	FOLIAR SPRAYING	6	BIO ORGANISM/FERTILIZER/SOIL ACTIVATOR/INHIBITOR	7 ML/SHUKAKURIKI	850.00	107.5 L	800 LITER SOLUTION/HILL	15,229.16	4.7

TABLE 1. COST ANALYSIS AT 50 PERCENT (%) RECOMMENDED RATE APPLICATION FOR SYNTHETIC FERTILLZER PLUS SHUKAKU RIKI AS BIO FERTILIZER COMBINATION APPLICATIONAT OF CACAO TREE AT 3,200 POPULATION UNIT/HAS.

PARTICULAR	NO. SPLIT/ CYCLE /PERIOD/YEAR	RECOMMEN DED RATE/ GRMS/ML /HILL	NO. OF BAGS/LITE RS PERIOD/ YEAR/HAS	UNIT PRICE	AT 50 (%) PERCENT /NO. BAGS	TOTAL AMOUNT	COST PER HECTARE/YEAR	COST OF MATERIAL/ YEAR/HAS	COST PER /HILL/APPLI CATION/HECT ARE/CYCLE	REMARKS
MIX FERTILIZER	4	250 GMS	64 B	1,700.00	32.2 B	54,4000	4,533.33	4,533.33	4.25	Farm Protocol Fert. Program
SHUKAKU RIKI (SOIL DRENCHING	6	7 ML	134.4 L	850.00	-	114,240.00	9,520.00	9,520.00	5.95	At assume 3,200 PO.UNIT/hectare for under preventive maintenance Soil Amendments.
				TOTAL	AMOUNT	168,980.00	14,081.66	14,081.66	10.20	

TABLE 2. COMPRATIVE COST ANALYSIS AT 100 PERCENT (%) RECOMMENDED RATE APPLICATION FOR SYNTHETIC FERTILLZER AGAINTS SHUKAKU RIKI AS BIO FERTILIZER COMBINATION APPLICATIONAT OF CACAO TREE AT 3,200 POPULATION UNIT/HAS.

PARTICULAR	NO. SPLIT/ CYCLE /YEAR	RECOMMEN DED RATE/ GRMS/ML HILL	NO. OF BAGS/LITERS PERIOD/ YEAR/HAS	UNIT PRICE	AT 100 (%) PERCENT /NO. BAGS	TOTAL AMOUNT	COST PER HECTARE /YEAR	COST OF MATERIAL/ YEAR/HAS.	COST PER /HILL/APPLI CATION/HECT ARE/CYCLE	REMARKS
MIX FERTILIZER	4	250 GMS	64. B	1,700.00	64 B	108,800.00	9,066.66	9,066.66	8.50	Farm Protocol Fert. Program
SHUKAKU RIKI (SOIL DRENCHING	6	7 ML	134.4 L	850.00	-	114,240.00	9,520.00	9,520.00	5.95	At assume 3,200 PO. UNIT/hectare for under preventive maintenance Soil Amendments.
				DIFERENCE	AMOUNT	5,440.00	453.34	453.34	2.55	

TABLE 3. COMPRATIVE COST ANALYSIS AT 100 PERCENT (%) RECOMMENDED RATE APPLICATION FOR SYNTHETIC FERTILLZER AGAINTS SHUKAKU RIKI AS BIO FERTLIZER WITH COMBINATION APPLICATIONAT 50 PERCENT (%) SYNTHETIC FERTILIZER OF CACAO TREE AT 3,200 POPULATION UNIT/HAS.

PARTICULAR	NO. SPLIT/ CYCLE /YEAR	RECOMME NDED RATE/ GRMS/ML HILL	NO. OF BAGS/LITERS PERIOD/ YEAR/HAS	UNIT PRICE	AT 100 (%) PERCENT /NO. BAGS	TOTAL AMOUNT	COST PER HECTARE /YEAR	COST OF MATERIAL/ YEAR/HAS.	COST PER /HILL/APPLI CATION/HECT ARE/CYCLE	REMARKS
MIX FERTILIZER	4	250 GMS	64. B	1,700.00	64 B	108,800.00	9,066.66	9,066.66	8.50	Farm Protocol Fert. Program
(A). SHUKAKU RIKI (SOIL DRENCHING	6	7 ML	134.4 L	850.00	-	114,240.00	9,520.00	9,520.00	5.95	At assume 3,200 PO. UNIT/hectare for under preventive maintenance Soil Amendments.
(B) MIX FERTILIZER	4	250 GMS	64 B	1,700.00	AT 50% 32 B	54,400.00	4,533.3	4,533.33	4.25	
		(A)	SUB TOTAL	AMOUNT -		108,800.00	9,066.66	9,066.66	8.50	
		(B & C)	SUB TOTAL	AMOUNT -		168,640.00	4,533.33	4,533.33	10.20	
			AMOUNT	DIFFERENCE		59,840.00	4,986.67	4,986.67	1.70	

PROCEDURE FOR SHUKAKU RIKI TREATMENT PROTOCOL

SITE SELECTION FOR CACAO VSD DISEASE TRIAL PLOT



