REPORT AND COMPARISON ON THE RESULTS OF USING COMPOST EXTRACTS IN A FIELD TRIAL

The test was done on March 2022 and ends on June 2022. It is located in Klaten, Central Java, Indonesia. The season starts with wet and ends in dry season. This is the best season for planting rice in the area.

PLANTING CONDITIONS

Land preparation in the wetland test was carried out for 4 days, namely to clean the remaining base of the rice stalks on the land. Planting is done after land preparation is complete, with 15 days of seedling age. Planting is done using a transplanter planting machine. The rice variant use is IR64, a commonly variant found in various parts of Asia.

Fertilizers used in the wetland test are:

- Solid Fertilizer (NPK Fertilization)

Number	Plant Age	NPK Weight	Remarks
	12 DAP (Days After Planting)	4 kg	50% of normal fertilizers. (As compared to Laboratory Microbes application)*

*Comparisons of applications of Inorganic Fertilizers, Laboratory Microbes and Compost Extracts on Field Trial 500 m2

- Liquid Fertilizer (Fertilization / Compost Extract Spraying)

Compost Extract Application Sequence	Time of Application	Remarks
1st	After previous harvest right after previous stalks are trimmed (About 3.9 gallons of extract /15 liters)	
2nd	Right before seedlings are planted with the addition of BT Plus (About 3.9 gallons of extract /15 liters)	With addition of BT Plus
3rd	18 DAP (About 3.9 gallons of extract / 15 liters)	With the addition of seaweed
4th	57 DAP / Panicles initiation stage (About 3.9 gallons of extract /15 liters)	With the addition of seaweed
5th	71 DAP / Booting stage / Grain stalks start to droop (About 3.9 gallons of extract /15 liters)	With the addition of seaweed

*Comparisons of applications of Inorganic Fertilizers, Laboratory Microbes and Compost Extracts on Field Trial 500 m2

Irrigation is carried out after planting rice, which is at the age of 7 DAP.

After that, watering was not done on a scheduled basis. This is because during the planting of the wetland test, there was an abundance of rainwater. The water on the land is controlled in a wet but not puddled. That is by opening a portion of the embankment with the aim of being a drainage channel for rainwater that enters the land in abundance, so that there is no high puddle of water on the test field.

Weeding in the wetland test was carried out 2 times, namely:

Weeding Sequence	Plant Age	Remarks
1st	14 DAP	Weeding with a weeding machine and a manual scrubber
2nd	24 DAP	Manual hand weeding (watun)

The control of pests and diseases in rice plants wetland test is carried out, namely:

Pest Control Application (Beauveria)	Plant Age	Remarks
1st	NA	Done after the land is processed completely and before planting as a precaution
2nd	25 DAP	This is done when leaf-eating caterpillars and stem borer eggs are found

Observations on rice plants wetland test as follows:

1. **Plant Height**

- Age 12 DAP
  The condition of rice plants at the age of 12 DAP was in good/healthy condition and reached an average height of 24 cm.

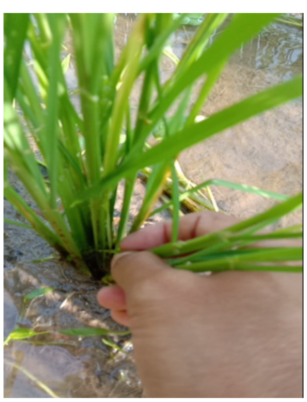
- Age 26 DAP
  Rice plants at the age of 26 DAP reached an average height of 48 - 49 cm

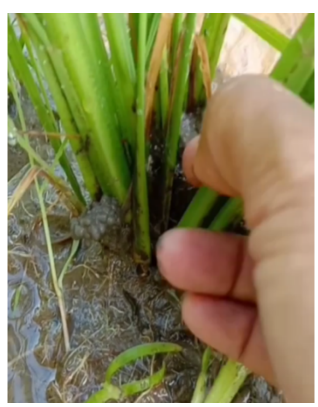



- Age 69 DAP
  Rice plant height at the age of 69 DAP with a height between 93 - 97 cm (Average reported height is 85 cm).



2. **Number of tillers of the clump**
   Rice plants at the age of 28 DAP contained rice tillers between 14 - 27 tillers. And it was also found that there were up to 34 tillers.





3. Panicle Stage

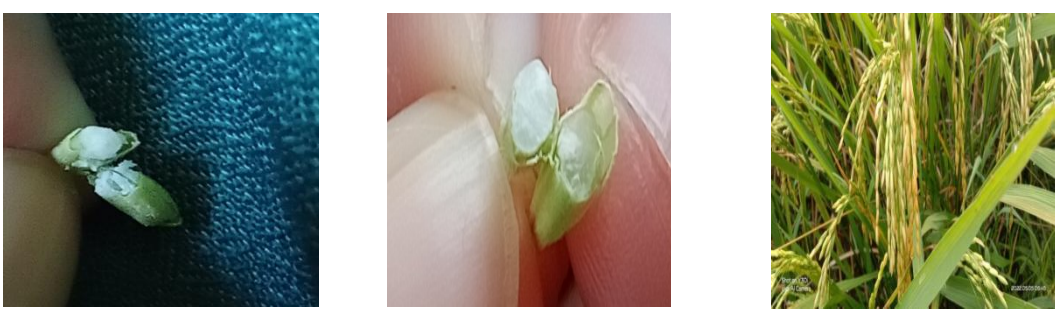
Rice plants in the wetland test were seen to have started to become pregnant at the age of 52 DAP.

4. Booting and Flowering Stages

Pollination has begun to be seen at the age of 65 DAP.

5. Milk Stage

Rice plants in the wetland test had entered the milk maturity stage at the age of 76 DAP.



The panicle length of the rice plant wetland test, which was measured at the age of 69 DAP reached between 93 - 100 cm.





6. **Dough Stage**

Rice plants in the wetland test have entered the yellow ripe stage at the age of 81 DAP.


7. **Mature Stage**

Rice plants in the wetland test had entered the full ripe stage at the age of 87 DAP. The time is right for harvesting.


8. **Wetland test Harvest**

Wetland test harvest was carried out on May 25, 2022, with the plant age of 98 DAP. The rice plants have entered the dead ripe stage. Unfortunately, there is a delay in harvesting related to harvesters who have just finished their partner's harvest, which have mostly collapses. At this dead ripe stage, the rice grains are susceptible / easy to fall off.

Post Harvest Conditions:
The following are some samples of rice clumps taken at random to calculate the number of productive tillers (Reported nationally **productive** tillers are between 11 to 20, with average 14.83) :

Number	Number of tillers in one clump	Productive tillers	Wet Grain Weight per clump	Documentation
1	14	13	34 gram	
2	15	12	34 gram	
3	15	14	35 gram	
5	17	16	44 gram	

7	22	19	48 gram	
8	23	17	44 gram	
9	25	23	58 gram	
10	25	20	54 gram	

9. Wet Grain Weight Fully Filled Per 1000 Grains

The weight of fully loaded wet grain per 1000 grains is as follows (Official record is 27 grams per 1000 grains):

Number	Wet Grain Weight Fully Filled per 1000 grains	Documentation

1	**38 grams**	

10. Wet Grain Weight of Tile Sample

Tiles are taken in 2 places with a size of 2 m x 2 m. After the rice plants were threshed with a threshing machine, the wet grain weight was found as follows:

Number	Tile	Wet Grain Weight (kg)
1	Tile 1	4
2	Tile 2	3

11. Total Grain Harvested in wetland test

After threshing, drying, and blower processes, the overall wet grain obtained in the wetland test is as follows:

Number	Wet Grain Weight (kg)	Dried Grains (Uncleaned) Weight (kg)	Dried Grains (Cleaned) Weight (kg)
1	200	178	174

12. Mechanical Milling Results

Of the 174 clean Dried Grains, the mechanical milling process was then carried out with a yield of 112 kg of rice. Following are the details of rice after the separation process is carried out between whole rice, broken rice and fine rice:

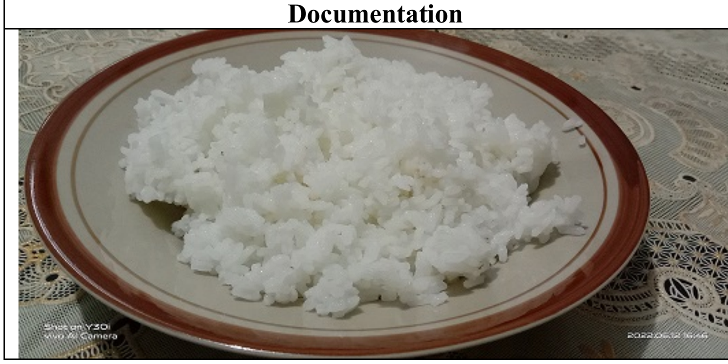
Number	Mechanical Milling Results	Weight (kg)
1	Whole Rice	93
2	Broken Rice	16
3	Fine Rice	3
4	Rice Brans	11
	TOTAL	123

This translates to about ((93+16)/174)*100% = 62.64% (Slightly lower than average performance of 65%). This result is indicative as various factors affect the results, from machinery, operator and other factors.

13. Quality of rice produced

Pre sorted Rice (before being optical process)	Post sorted Rice (before being optical process)
	

14. **Rice Flavor**
    Whole rice, pure white, fluffier, savory, soft and does not require a lot of water when cooking.

Documentation	**Remarks**
	Whole rice, pure white, fluffier, savory, tender.

The following is the estimated production cost in one rice planting season for Conventional Farmers and Partnered Farmers.

1. **Estimated Production Costs for Conventional Smallholders Area 2800 - 3000 m²**

Number	Remarks	Amount
A	**Main Costs**	
	Plow fee	Rp 500 000
	Rice planting package costs (Seeds and Planting Process)	Rp 700 000
	Herbicides (besides being cleaned with a scrubbing tool, Conventional Farmers also use Grass Medicine)	Rp 90 000
	Urea First Fertilization (12 days after planting)	Rp 135 000
	NPK (brand name: Phonska) Second Fertilization 25 days after planting	Rp 145 000
	Cover fertilizer NPK (brand name: Phonska) 40-45 days after planting. (Conventional farmers in doing cover fertilization there are 2 options, namely: 1. **NPK (brand name: Phonska) Rp 145 000** 2. **Pupuk Kujang Rp 600 000.** Most conventional farmers do cover fertilization. Only a small number of conventional farmers do not do this cover fertilization	Rp 145 000
	Amount	Rp 1 715 000
B	**Other Costs/optional/Under Certain Conditions:**	
	Pumping water costs during planting (during dry season)	Rp 500 000
	Cost of bund construction	Rp 600 000
	The cost of Pest / planthopper medicine when exposed to pests	Rp 100 000
	Amount	Rp 1 200 000
	Total Cost of Production for Conventional Farmers	**Rp 2 915 000**

2. Estimated Production Costs of Partnered Farmer TSI Area 2800 - 3000m² With Transplanter Machine (Laboratory microbes)

Number	Remarks	Nominal
A	**Main Costs**	
	Plow fee	Rp 500 000
	Rice Seedling (from TSI Nursery)	Rp 420 000
	Cost of Planting (Transplanter from TSI)	Rp 200 000
	Bio Compost * (5 Sacks)	Rp 125 000
	Liquid Fertilizer (2 Bottles POC)	Rp 100 000
	Liquid Fertilizer (1 Bottle of Nutrients)	Rp 60 000
	Beauveria (1 Sachet)	Rp 22 000
	Corine (1 Bottle)	Rp 22 000
	Harvest Cost	Rp 200 000
	Amount	Rp 1 649 000
B	**Other Costs/optional/Under Certain Conditions:**	

	Pumping water costs during planting (during dry season)	Rp 500 000
	Cost of bund construction	Rp 600 000
	Amount	Rp 1 100 000
	Total Production Cost of Partnered Farmer TSI (Transplanter)	**Rp 2 749 000**

*With the unavailability of organic fertilizer, farmer partners replace sow fertilizer with NPK @ Rp 145 000

3. Estimated Production Costs of Partnered Farmer TSI Area of 2800-3000m² with Manual Planting (Laboratory microbes)

Number	Remarks	Nominal
A	**Main Costs**	
	Plow fee	Rp 500 000
	Seeds	Rp 198 000
	Manual planting costs	Rp 400 000
	Bio Compost * (5 Sacks)	Rp 125 000
	Liquid Fertilizer (2 Bottles POC)	Rp 100 000
	Liquid Fertilizer (1 Bottle of Nutrients)	Rp 60 000
	Beauveria (1 Sachet)	Rp 22 000
	Corine (1 Btl)	Rp 22 000
	Harvest Cost	Rp 200 000
	Amount	Rp 1 627 000
B	**Other Costs/optional/Under Certain Conditions:**	
	Pumping water costs during planting (during dry season)	Rp 500 000
	Cost of bund construction	Rp 600 000
	Amount	Rp 1 100 000
	Total Production Cost of Partnered Farmer TSI (Manual Planting)	**Rp 2 727 000**

*With the unavailability of organic fertilizer, farmer partners replace sow fertilizer with NPK @ Rp 145 000

4. Estimated Production Costs of Partnered Farmer TSI Area of 2800-3000m² with Manual Planting (Compost Extracts)

Number	Remarks	Nominal
A	**Main Costs**	
	Plow fee (Only secondary till and leveling)	Rp 400 000
	Seeds	Rp 198 000
	Manual planting costs	Rp 400 000
	Bio Compost * (5 Sacks)	Rp 125 000
	Beauveria (1 Sachet)	Rp 22 000
	Harvest Cost	Rp 200 000
	Amount	Rp 1 345 000
B	**Other Costs/optional/Under Certain Conditions:**	
	Pumping water costs during planting (during dry season)	Rp 500000
	Cost of bund construction	Rp 600000
	Amount	Rp 1 100 000

	Total Production Cost of Partnered Farmer TSI (Manual Planting)	**Rp 2 445 000**

*With the unavailability of organic fertlizer, farmer partners replace sow fertilizer with NPK @ Rp 145 000

Conclusions:

The application of compost extract + BT has provided great hope in improving the resistance of the rice crops in combating its major pests and diseases (except rats and birds) and ability to recover after an attack from such problems. The second benefit is ability to improve soil structures, as can be seen by better tilth. This can also translate in reducing costs in soil preparation with the elimination of primary tilling activity. The third benefit is ability of the rice paddy plants to generate yield despite low application of inorganic NPK (50% compared to Lab Microbes), which shows better intake of the nutrients by the plants. The fourth benefit is the compost extracts can be used as a biomass decomposer to prepare the land for sowing right after a harvest. This not only reduce the number of external decomposer to be purchased, stored and other logistic issues, it also provides an increase organic C content in the soil that is readily available on the field after harvest. It is easy to make and applied the compost extract (for example apply at early stage of planting without further complicated time table as compared to other means of crop protections), which provide an extremely valuable tool in helping to mitigate the planting risks in the field. Another benefit, which is not mentioned in the report, is the ability of the compost extract to help the seeds reach the stage of planting in seedling with the transplanting machine. The time limit to reach 2 leaves by the seedlings to be able to be transplanted is 14 days. This is to ensure sufficient reserve nutrients or endosperms in the seeds which translate to better root growth and better adaption to the new environment. In this experiment, without any organic fertilizers in the seeds trays, with only alluvial soil + extract + water, is 15 days compared to 21 days in the field. Further improvement can be made with the addition of organic fertilizers during this stage in a 2:1 alluvial soil / organic fertilizer.

The downside of such method is retraining of the workforce to ensure cleanliness and proper application of the compost extract. This needs retraining of the mindset of the workers, or assigned dedicated people to the tasks.

Further research is needed in replacing inorganic NPK with organic fertilizers.

Note:

This document is accompanied by another document titled "Comparison of applications of Inorganic Fertilizers, Laboratory Microbes and Compost Extracts on Field Trial 500 m2".

Footnote:

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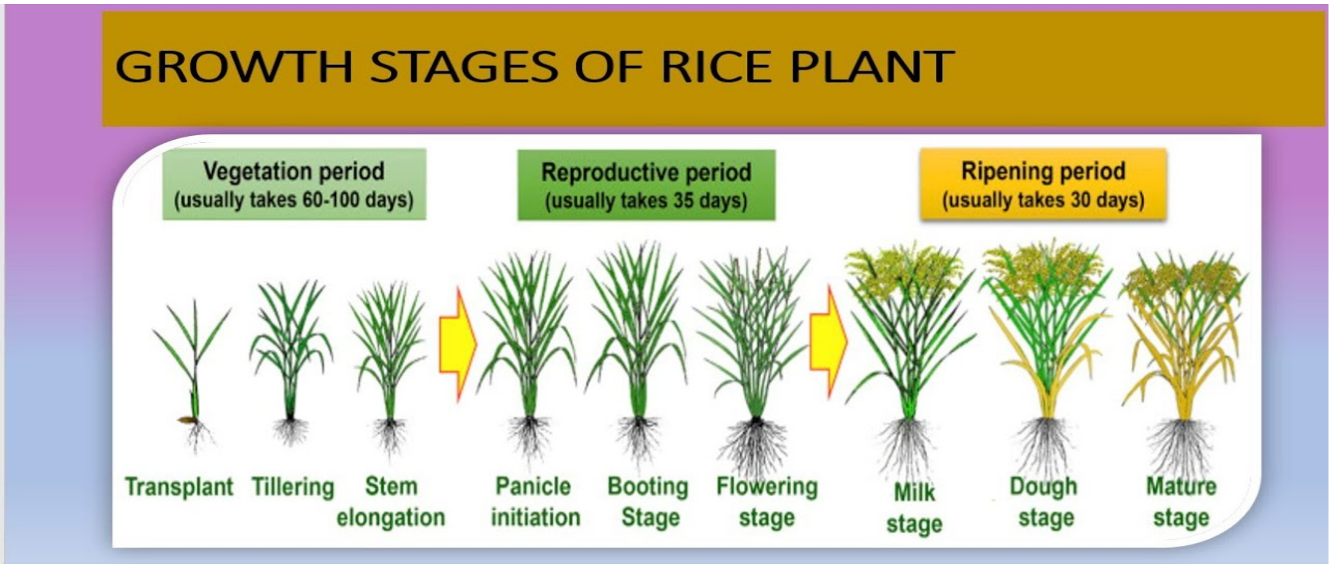
Implementor: Tanah Subur Indonesia


GROWTH STAGES OF RICE PLANT
Vegetation period
(usually takes 60-100 days)
Reproductive period
(usually takes 35 days)
Ripening period
(usually takes 30 days)
Transplant
Tillering
Stem elongation
Panicle initiation
Booting Stage
Flowering stage
Milk stage
Dough stage
Mature stage