CONTRIBUTION OF ORGANIC FERTILIZER OF TITONIA PLUS AND MICRO NUTRIENTS TO IMPROVE RICE PRODUCTION USING SRI METHODS

NalwidaRozen ,Gusnidar, and Nurhajati Hakim
Faculty of Agriculture, University of Andalas Padang
e-mail : nalwida_rozen@yahoo.co.id

Abstract— A series of field experiments were conducted in the farmer lands in two location in Padang, Koto Panjang and Koto Tingga, in 2015. The purpose of the experiment was to establish the formula of organic fertilizer derived from titonia with micro nutrients, Zn and Mn, in order to reduce synthetic fertilizer application by 50% to get rice yield about 7 tons ha^{-1}. The experiments were conducted using Randomized Block Design with 6 treatments and 3 replications.The treatments were P = OFTP + 3.0 kg Mn / ha + 0 kgZn / ha, Q = OFTP + 3.0 kg Mn / ha + 3.0 kgZn / ha, R = OFTP + 4.5 kg Mn / ha + 6 kg Zn / ha, S= OFTP + 4.5 kg Mn / ha + 9 kgZn / ha, T = OFTP only, U = 100% synthetic fertilizer only. The experimental results showed that treatment of Micro nutriens addition to OFTP to increase yield paddy in Padang city is TOFP+3.0kgMn/ha+0kgZn/ha and OFTP+3.0kgMn/ha+3.0kgZn/ha to increasing of yield 80 g/clump.

Keywords: OFTP, micro nutrients, paddy, SRI

I. INTRODUCTION

One reason why rice yield tended to level of lately was due to the disruption of the nutrient balance in soil as a consequence of the use of synthetic fertilizers which are limited to nitrogen (N), phosphorus (P) and potassium (K) elements only. actually, there are 13 kinds of nutrients needed plants from the soil [1]. Organic fertilizers, contain all of the nutrients the plants need, not only the N, P and K, but also Calsium (Ca), Magnesium (Mg) And Sulfur (S), as well as elements which include iron (Fe), Zinc (Zn), Manganese (Mn), Copper (Cu), Boron (B), Chlorine (Cl), And Molybdenum (Mo). Besides the problem of nutrients that are not balanced, the synthetic fertilizers which are also more expensive, become a major problem for farmers. There fore, the use of synthetic fertilizers should be reduced without lowering production. one way to reach it is by using organic fertilizer [2].

Rice straw is the main source of organic matter in paddy soil when it is returned to the soil. The composition of nutrients in rice straw containing approximately 0.6% N; 0.1% P; 1.5% K; 0.1% S; 5% Si and 40% C. Incorporation of straw into a rice field can increase the content of organic C, N, P-available, K, and Si, thereby increasing rice yield. Although the rice straw is the main source of organic matter in paddy soil, but the habits of farmers prefer to burn straw, with consideration easily implemented. Since the adoption of SRI methods, utilization of straw began to attract attention [3]. In order to accelerate the weathering straw composting is done with biological agents such as *Trichoderma Harziaman.*

[4] The use of 2.5 tons Titonia + 150 kg of urea in paddy intensification can provide higher rice yield 8 tonnes ha-1. The paddy soil is already rich with P and K for an intensification of rice fields since 20 years ago, so the addition of Titonia alone can save the application of N, P and K in paddy intensification of 50 to 75%.

Based on fact explained above, [5.6.7] tried to solve the problem by gathering and using organic fertilizer of Titonia plus (OFTP), which is an organic fertilizer made with raw materials Tithonia (*Tithonia diversifolia*), plus rice straw and/or manure, lime, P nutrient, and microorganisms (biological agents). Basic usage of OFTP is becaused that OFTP contains relatively high macro nutrients (N, P, K, Ca, Mg and S).

[8.9] reported that the average nutrient content of Titonia found in West Sumatera around 3.16% N, 0.38% P, and 3.45% K. The addition of N, P, and K, Titonia also has the nutrient content of 0.59% Ca and 0.27% Mg [6.7] Titonia growth well along time in the river, read and lake. [9.10]. [8] Crop weed Titonia (stems and leaves as long as 50 cm from the tip) that were collected from several locations in West Sumatra, on average contains nutrients as much as 3.16% N; 0.38% P; and 3.45% K.

Titonia (*Tithonia diversifola*) or sunflower Mexico (Mexican sunflower) is a countryman of weeds that can grow well all the ordo to soil, containing nutrients are high, especially N and K, which is about 3.5% N, 0.38% P, and 4 , 1% K [11]. Titonia also contains 0.59% Ca; and 0.27% Mg [12]. [8] reported that crop weed Titonia (stems and leaves as long as 50 cm from the tip) that were collected from several locations in West Sumatra, on average contains nutrients as much as 3.16% N; 0.38% P; and 3.45% K.

[6,7] reported that the use OFTP for the rice cultivation using SRI method could reduce the use of synthetic fertilizers N and K up to 50%, with the results were slightly higher than that of using 100% synthetic fertilizers. Utilization of OFTP on rice cultivation using SRI method could produce a grain of 4.6 – 5.0 ton ha^{-1} in Air Pacah, the city of Padang, 3.6 - 4.6 ton ha^{-1} in Jawi-Jawi, Solok regency, and as many as 6.8 to 7.0 tons ha^{-1} in Tanah Datar. However, they stated that the results obtained in paddy rice intensificatio were, not optimal as expected (about 8 tons.ha^{-1}). [6] suspected that one reason may be because by a lack of micro elements indicated by symptoms which were brownish yellow spots (browning) on the paddy leaves.

[13] Reinokulasi mycorrhiza + JPF on Titonia rhizosphere cultivated as a fencing hall can generate as much as 8.13 tonnes of dry matter, total 201.4 kg N; 25.9 kg P; and 215 kg K per year per 0.20 ha of land. [14] also managed to cultivate Titonia around the site on the edge of rice fields as irrigation canals and roadside farm. Thus, it can be stated that the Titonia very viable as a source of organic fertilizer raw materials.

Although the rice straw is the main source of organic matter in paddy soil, but the habits of farmers prefer to burn straw, with consideration easily implemented. Since the adoption of SRI methods, utilization of straw began to attract attention [15]. In order to accelerate the weathering straw composting is done with biological agents such as Trichoderma harzianum. [14] Apparently, the formula which has been published OFTP need to be equipped with micro elements such as Fe, Mn, Zn, Cu, B, Cl, or Mo. Next will be explained the role of micronutrients.

[16] The results of monitoring the implementation of SRI in East Nusa Tenggara from 2002-2006 showed an average increase in results of 78% and 40% reduction in water consumption, reduction in fertilizer application to 50% and reduce production costs 20%. Application of SRI method can increase the yield to 2 times more than the conventional method that is already saturated.

[17] At SRI number of tillers be accelerated more quickly because the transplant is done early, so the seedling growth very quickly according to phyllochrons concept, a concept that was applied to the family Graminae, including grain crops such as rice, wheat, and barley. Phyllochrons usually occurs on day 5-7, but can be faster depending on the conditions of temperature, day length, humidity, soil quality, in contact with water, and light and nutrient availability. Under good conditions, the vegetative phase of the rice plant can run for 12 times pyllochrons before the plant starts forming panicles or panicle initiation. In contrast, in nutrient-poor conditions, phyllochrons lasts longer and only a few are able to reach the flowering phase. In the third phllochrons plant will form tillers doubled (exponential).

Likewise, according to [18] that the SRI method can form the tiller until doubled due to this method phyllocron formed up to 12 times. Phyllochron is a series formed phytomer during 3-5 days depending on temperature. Added by [19] that phyllocron affected by temperature, age moved seedlings and breeding methods.

Phyllochron, defined as the interval time between appearances of successive leaves on a

shoot, is an important measurement to know the developmental state of a shoot apex in rice. Previous studies revealed that phyllochron dynamics during the course of shoot development of rice was divided into three stages, regardless of environment and
genotype [20].

Number of tillers per hill with SRI than conventional treatment which is significantly higher in the SRI method (25.27 stems) than conventional (23.17 stems). The treatment of NPK + Zn also provide a significant number of suckers that is higher than the NPK fertilizer treatment without Zn. So is the rice yield in the delivery of higher NPK + Zn (5.72 ton.ha^{-1}) compared to NPK without Zn (4.87 ton.ha^{-1}) [21].

SRI can increase the density of seedlings planted panicles when younger (less than 18 days age) depending on the varieties. Number of grains per panicle more planted at 14 days age compared to 28 days age as well as grain yield per unit area is also higher [22].

[23] Based on the information from the previous researches, it seemed that OFTP was not able to provide sufficient micro elements for the rice crops to produce optimal yield on system of rice intensification (SRI). However, it is not known which one of the Micronutrients which is lacking among the 7 elements (Fe, Mn, Zn, Cu, B, Cl and Mo). There fore, it needs to be further investigation. Assessment of the micro elements are relatively underdeveloped. In the case of Micro elements as essential nutrients are needed, although in small quantities [6].

Based on the background and issues that have been raised, [7] had continued the research that had been applied in the field, returned to the greenhouse with pot experiment treatment of 6 kinds of micro elements (Fe, Mn, Cu, Zn, B, Mo) on paddy rice by OFTP + 50% synthetic fertilizer N and K, plus OFTP treatment alone, and 100% synthetic fertilizers alone. Results of that study concluded that micro elements required by the rice crop besides OFTP was Mn with an increase of 21% and Zn with 17% increase in the results [24].

The purpose of this study was to complete OFTP formula with micro nutrients (Mn and Zn) to reduce the application of synthetic fertilizers by 50% on rice cultivation using SRI method with yield target was equal to or greater than 8 tons/ha. Long-term goal was to reduce the dependency of farmers on synthetic fertilizers and accelerate the realization of self-sufficiency in rice, towards resilience and national food security [24].

Outcomes of this study is the formula for OFTP equipped micronutrient to be transferred to the farmers and patented. Benefits for partners, namely the Department of Agriculture (Ministry of Agriculture) are (1) the availability of the technology package of organic fertilizer plus having the raw materials from local resources (Titonia, straw, lime, biological agents) to be applied at the farm level in order to reduce the application of synthetic fertilizers by 50%, the rice yield higher than 100% synthetic fertilizers, (2) for farmers to reduce dependency on synthetic fertilizers, and (3) for employers of organic fertilizer is the availability of formula and method of manufacture of organic fertilizer plus (POTP) has to be produced (after being patented).

[25] and [26] reported that high nutrient levels in Titonia was caused by a biological agent that lives in rizosfirnya. In the rhizosphere Titonia found bacteria such Azosspirillum N fastening and Azotobacter, bacteria phosphate solvent (BPF), mushrooms solvent phosphate (JPF). Similarly, in another study application of Zn gave the highest grain yield of rice with 41.8% yield increase over control **[27]**.

SRI practices, rice varieties performed well and all the plant parameters studied were improved under the SRI method as compared to the traditional method. Beside this, rice variety Fakhre Malakand gave the best results in comparison to other rice varieties under the SRI practices. Similarly, the fertilizer treatments positively affected rice attributes and under combined application of fertilizers and zinc, all the rice yield attributes were improved [24].

In SRI, wider spacing is recommended to allow for vigorous root growth and profuse tillering; however, it may be variety-dependent and location-specific. The square geometry at wider spacing facilitates the movement of

mechanical weeder, which is one of the other essential components of the SRI technique. Thus, the individual as well as the nteraction effect of key production components, such as genotype, irrigation regime and crop geometry on yield forming processes and yield of rice under SRI need to be investigated [28].

The System of Rice Intensification produced higher grain and straw yields in all three irrigation regimes compared with CT. This could be due to the higher number of tillers with larger and heavier panicles under SRI [29].

Phyllochron began to drastically increase after around the 5th phytomer order and decreased with the progress of reproductive development in similar manners under different environments. The pattern of phyllochron change varied from a flat to non-flat shape. The shape of the equation was affected by genotypes as well as daylengths and temperatures. In addition, the shape was closely related to the growth duration (days to heading) of the genotype, suggesting that the phyllochron might internally increase depending on the genotype controlling the heading date. Therefore, the present results showed that the sufficient examination of phyllochron dynamics is necessary for understanding a variation in the heading date of rice [29].

Phyllochron, defined as the interval time between appearances of successive leaves on a shoot, is an important measurement to know the developmental state of a shoot apex in rice [30].

II. MATERIALS AND METHODS

This field experiment was conducted at farmer lands in Padang city , then soil and plant analyses were done at soil laboratory Agriculture Faculty, as well as at Laboratory of Environmental engineering, Andalas University from February to September 2015.

Based on the results of previous research, the experiment design used was a randomized block design consisting of 6 treatments and 3 blocks, as follows:P = OFTP + 3.0 kg Mn / ha + 0 kgZn / ha, Q = OFTP + 3.0 kg Mn / ha + 3.0 kgZn / ha, R = OFFP + 4.5 kg Mn / ha + 6 kgZn / ha, S= OFTP + 4.5 kg Mn / ha + 9 kgZn / ha, T = OFTP only, U = 100% synthetic fertilizer only.

All treatments received OFTP plus 50% of synthetic fertilizers for N and K as needed by rice plants at the trial site. Plant data obtained were analysed the variance (F-test) and then continued using LSD at 5% level of significance if the variance was significantly different.

Synthetic fertilizers used were Urea, SP36, KCl and Kieserite. Micro nutrients source used as treatments were MnSO4 and ZnSO4. Rice seed variety used was IR-42. Materials for OFTP were titonia, rice straw, lime, and biological agents such as Stardec, Trichoderma, and phosphate solving bacteria. Tools of Agriculture.

Titonia and straw are made into compost by adding manure, stardec, trichoderma, and phosphate solvent bacteria. After the material decays and becomes compost then added micro elements according to treatment. This POTP is given to the appropriate field of treatment the week before the transplanting. POTP is spread evenly on the experimental plots and then immersed in the soil.

Parameters analyzedwere soil and OFTP nutrient contents, plant height, total number of tillers, number of productive tillers, dry weight of straw and grain.

III.RESULTS AND DISCUSSION

A. Analysis of Soil Nutrient Levels

Table 1. Analysis of soil nutrients in two pilot sites

Location	pH	N %	C-org c %	P-ppm	Came/100g	K %	Mg %	Mn ppm	Zn ppm
Koto Tinggа	5.6	0.1	1.7	20.9	0.7	0.9	1.7	0.6	1.0
Koto Panjang	6.3	0.2	2.4	9.5	0.8	1.0	0.9	0.8	0.2

Data on Table 1 shows that soil P content in Koto Tingga was much higher than that in Koto Panjang. This is due to the fact that rice field in Koto Tingga was regularly got additional N, P, and K elements in forms of Urea, TSP, and KCl. There fore, P-potential of the soil was very high but it was bound, so that P could not be absorbed by plants. While in Koto Panjang, farmers had already started applying compost hay to their land, so that the P level was lower but more available to plants. The pH in Koto Panjang is close to neutral (6.3) while the pH of Koto Tingga is sour (5,6). Other nutrient elements are also higher in Koto Panjang except Mg and Zn.

B. Analysis of nutrient content of OFTP

Analysis of nutrient content of OFTP was presented in Table 2 below .

Table 2. Analysis of the nutrient content of OFTP

Na (%)	N (%)	P (%)	C-orgk (%)	Mg (%)	K (%)
0.29	0.95	1.5	0.68	0.35	0.35

Data in Table 2 indicated that the OFTP had high content of P element,so OFTP can contribute P for plant growth, besides it can also help to release P bound in the soil to be available to plants. OFTP addition to containing nutrients P is very high, too high levels of N. This greatly helps soil fertility in paddy intensification. OFTP can release P available in the soil so that plants can absorb the P element. P element is very useful for seed formation.

C. **Height of Rice Plant**

Data from analysis of variance showed that the height of rice plants (Table 3) at different locations was not significant. This can be seen in Table 3 below.

Table 3. Height of rice plants in Koto Panjang and Koto Tingga at 56 days after replanting

Treatment / Micro nutrient / ha	Height of Plant (cm)	
	Koto Panjang	Koto Tingga
OFTP+3kgMn +0kgZn	92.93	82.20
OFTP+3.0kgMn+3.0kg	88.20	80.13
OFTP+4.5kgMn +6.0kgZn	89.27	79.40
OFTP+4.5kgMn +9.0kgZn	92.27	78.67
OFTP only	91.93	79.93
Synhetic fertilizers 100%	92.07	84.80

The figures in the same column followed by the same lowercase not significant according to the LSD on the real level of 5%.

From Table 3 above, it appears that plant heights at both locations showed differences. This is because of the locations used had different soil characteristics, especially soil pore distribution. Paddy soil in Koto Panjang had less porosity than that in in Koto Tingga, so that water could not be held longer by soil in Koto Tingga Application of OFTP into the soil in Koto Tingga could help soil to hold more water for plant growth.

In order to accelerate the weathering straw composting is done with biological agents such as *Trichoderma harzianum*. [20] Apparently, the formula which has been published OFTP need to be equipped with micro elements such as Fe, Mn, Zn, Cu, B, Cl, or Mo. Next will be explained the role of micronutrients.

[25] and [26] reported that high nutrient levels in Titonia was caused by a biological agent that lives in rizosfirnya. In the rhizosphere Titonia found bacteria such Azosspirillum N fastening and Azotobacter, bacteria phosphate solvent (BPF), mushrooms solvent phosphate (JPF).

D. **Total number of Tillers**

Based on analyses of variance, total number of tillers among the treatments showed no significant in both pilot sites, as shown in Table 4 .

Table 4. Number of total tillers of rice plants in Koto Panjang and Koto Tingga at 56 days after replanting

Treatment / Micro nutrient/ ha	The number of total tillers (stem)	
	Koto Panjang	Koto Tingga
OFTP+3kgMn +0kgZn	45.87a	42.67 b
OFTP+3kgMn +3kgZn	43.40 b	43.80 b
OFTP+4.5kgMn+6kg Zn	40.80 b	42.33 b
OFTP+4.5kgMn	41.93 b	48.00 a

+9kgZn		
OFTP only	44.73 a	53.93 a
Synhetic fertilizers 100%	41.93 b	53.53 a

The figures in the same column followed by the same lowercase were not significant according to the LSD at 5% level of significance

Tabel 4 showed that the total number of seedlings at the two locations is much more than that at the conventional way (Synthetic fertilizer 100%). Method of SRI could increase the number of tillers of rice plants because rapid transplanting (12-15 days age) makes the rice plants produced more seedlings after transplanting instead of in the nursery (as conventional rice cultivation).

Total number of tillers were significantly different in the two trial sites and more tillers formed on the addition OFTP treatment than just giving synthetic fertilizers alone. OFTP additions can increase the total number of tillers and higher than that of synthetic fertilizers. This is because the content OFTP fuller, besides containing macro nutrients also contain micro nutrients.

[18] that the SRI method can form the tiller until doubled due to this method phyllocron formed up to 12 times. Phyllochron is a series phytomer formed during 3-5 days depending on temperature. Added by [14] that phyllocron affected by temperature, age moved seedlings and breeding methods.

[17] at SRI number of tillers be accelerated more quickly because the transplant is done early, so the seedling growth very quickly in accordance with the concept phyllochrons, a concept that was applied to the family Graminae (grasses), including grain crops such as rice, wheat, and barley. According Uphoff (2002) SRI method can form a seedling until doubled due to this method phyllocron formed up to 12 times. Phyllochron is a series phytomers formed during 3-5 days depending on temperature.

Number of tillers per hill with SRI than conventional treatment which is significantly higher in the SRI method (25.27 stems) than conventional (23.17 stems). The treatment of NPK + Zn also provide a significant number of suckers that is higher than the NPK fertilizer treatment without Zn. So is the rice yield in the delivery of higher NPK + Zn (5.72 ton.ha^{-1}) compared to NPK without Zn (4.87 ton.ha^{-1}) [21]. It turns giving Zn better for the growth and yield of rice plants than without Zn. Zn micro elements required by rice plants to grow and develop, albeit in small amounts.

In addition, the treatment given OFTP will add micro nutrients in the soil, so that with the addition of OFTP can boost rice tillering. Tillers are formed more by OFTP treatment compared to only synthetic fertilizer N (for the fields in Koto Panjang). While the rice fields in Koto Tingga OFTP administration just as the number of tillers formed with fertilizer synthetic treatment. This is because both sites have different levels of soil fertility. We can see on the nutrient content of the soil at two locations (Table 1) that the rice land in Koto Tingga contains elements that P very highly, while the fields in Koto Panjang nutrient content of soil P were moderate. Nutrients very high P can not be used by rice plants, necessitating the addition of organic fertilizer to paddy soil. In terms of soil acidity turns rice land in Koto Tingga more sour than in Koto Panjang.

E. Number of Productive Tiller

The number of productive tillers after being analyzed of the variance showed that there was no significant results in the two pilot sites. This can be seen in Table 5 .

Table 5. The number of productive tillers in Koto Panjang and Koto Tingga 105 days after replanting

Treatment / Micro nutrient / ha	The number of productive tillers (stem)	
	Koto Panjang	Koto Tingga
OFTP+3kgMn +0kgZn	25.53	22.07
OFTP+3kgMn +3kgZn	24.40	20.80
OFTP+4.5kgMn +6kgZn	25.87	21.87
OFTP+4.5kgMn+9kgZn	21.33	22.47

OFTP only	24.80	24.53
Synhetic fertilizers 100%	28.53	24.80

The figures in the same column followed by the same lowercase not significant according to the LSD on the real level of 5%.

The Table 5 shows that the number of productive tillers of IR42 variety of rice plants at both locations using SRI method was more than that conventional method (synthetic fertilizer 100%). This is caused by the fact that the rice plants cultivated with SRI method could improve productive tillers. This is because the SRI method by planting seedlings of trees per planting hole to make rice plants grow rapidly because there is no competition among plants.

[17] At SRI number of tillers be accelerated more quickly because the transplant is done early, so the seedling growth very quickly according to phyllochrons concept, a concept that was applied to the family Graminae, including grain crops such as rice, wheat, and barley. Phyllochrons usually occurs on day 5-7, but can be faster depending on the conditions of temperature, day length, humidity, soil quality, in contact with water, and light and nutrient availability. Under good conditions, the vegetative phase of the rice plant can run for 12 times pyllochrons before the plant starts forming panicles or panicle initiation. In contrast, in nutrient-poor conditions, phyllochrons lasts longer and only a few are able to reach the flowering phase. In the third phllochrons plant will form tillers doubled (exponential).

F. Dry Grain Weight

Grain dry weight showed significantly different results at the paddy fields in Koto Panjang, while there was no significant results in KotoTingga. This can be seen in Table 6.

Table 6. Dry grain weight of grain in Koto Panjang and KotoTingga age 105 days

Treatment / Micro nutrient / ha	Dry weight of grain (kg)	
	Koto Panjang	Koto Tingga
OFTP+3.0kgMn+0kg Zn	71.87 b	83.60
OFTP+3.0kgMn+3.0kg	71.87 b	85.13
OFTP+4.5kgMn+6.0kgZn	73.10 b	84.20
OFTP+4.5kgMn+9.0kgZn	73.47 b	83.73
OFTP only	72.97 b	82.90
Synhetic fertilizers 100%	80.27a	84.43

The figures in the same column followed by the same lowercase not significant according to the LSD on the real level of 5%.

From the Table 6 shows that the grain dry weight of paddy rice (variety IR42) showed that there was significant difference among the treatment in Koto Panjang, but in Koto Tingga showed no significant result. Differences significant grain dry weight in rice fields in Koto Panjang caused by synthetic fertilizers provided directly can be used by plants, while OFTP slow process so that the plant is less rapid availability of absorbing nutrients that exist in OFTP. While the dry weight of grain in Koto Tingga results are relatively similar in each treatment. OFTP provide nutrients that are relatively similar to synthetic fertilizers. Riceland in Koto Tingga never given organic fertilizers so that with the addition of organic fertilizer can increase grain dry weight.
Study application of Zn gave the highest grain yield of rice with 41.8% yield increase over control **[27]**.

The result of the dry weight of grain in Koto Tingga relatively the same at any given treatment. This is because OFTP can improve soil fertility. [8] and [9] reporter that high volume of nutrient in titonia depended on bioagent in their rhyzosphere. In the rhyzosphere of titonia founded nitrogen fixation bacteriea such as *Azosspirillum* and *Azotobacter,* phosphate solublizing bacteriea, and phosphate solublizing fungy.

SRI can increase the density of seedlings planted panicles when younger (less than 18 days age) depending on the varieties. Number of grains per panicle more planted at 14 compared to 28 days age as well as grain yield per unit area is also higher.[22]

[16] The results of monitoring the implementation of SRI in East Nusa Tenggara

from 2002-2006 showed an average increase in results of 78% and 40% reduction in water consumption, reduction in fertilizer application to 50% and reduce production costs 20%. Application of SRI method can increase the yield to 2 times more than the conventional method that is already saturated.

G. Dry weight of Straw

Straw dry weight of rice plant in Koto Panjang was significantly different among the treatments, where as in Koto Tingga shows no significance. Data of straw dry weight of rice plants was presented in Table 7.

Table 7. Weight of dry straw of rice plants in Koto Panjang and Koto Tingga

Treatment / Micro nutrient / ha	Weight of dry straw (kg)	
	Koto Panjang	Koto Tingga
OFTP + 3.0 kgMn +0kgZn	39.47a	34.36b
OFTP+3.0kgMn +3.0kg	36.83 b	34.23b
OFTP+4.5kgMn +6.0kgZn	36.87 b	33.23 b
OFTP+4.5kgMn +9.0kgZn	34.90 b	37.03a
OFFP only	34.83 b	32.97 b
Synhetic fertilizers 100%	42.50a	36.47 a

The figures in the same column followed by the same lowercase not significant according to the LSD on the real level of 5%.

In the Table 7 above shows that, the dry weight of straw was slightly higher in Koto Panjang than in Koto Tingga. Dry weight of straw from treatment using synthetic fertilizer only was higher than that from the other treatments in Koto Panjang.. The dry weight of straw significantly different both in the fields in Koto Panjang and in the fields in Koto Tingga. At the Koto Panjang, giving OFTP + 3kg Mn/ha + 0kgZn/ha provide higher dry weight straw and together with the treatment of 100 synthetic fertilizers, but significantly different from other treatments. But in Koto Tingga, treatment OFTP + 4,5kgMn/ha + 9kgZn/ha gives equal weight with the treatment of dry straw 100 synthetic fertilizers and significantly different from other treatments. Seem here that in both these fields need additional land OFTP plus micronutrients. The second trial sites have different types of soil so that the response of plants will also vary with the treatment given. Soil of the field in Koto Tingga has never been given an organic fertilizer at all, while the fields in Koto Panjang often given organic fertilizer.

[6,7] reported that the use OFTP for the rice cultivation using SRI method could reduce the use of synthetic fertilizers N and K up to 50%, with the results were slightly higher than that of using 100% synthetic fertilizers. Utilization of OFTP on rice cultivation using SRI method could produce a grain of 4.6 – 5.0 ton ha^{-1} in Air Pacah, the city of Padang, 3.6 - 4.6 ton ha^{-1} in Jawi-Jawi, Solok regency, and as many as 6.8 to 7.0 tons ha^{-1} in Tanah Datar. However, they stated that the results obtained in rice plant intensification were, not optimal as expected (about 8 tons.ha^{-1}). [6] suspected that one reason may be because by a lack of micro elements indicated by symptoms which were brownish yellow spots (browning) on the paddy leaves.

It is advisable to reduce of organic fertilizer of Titonia plus to the paddy field in order to increase the yield of rice plants, with treatment is OFTP+3.0kgMn/ha+0kgZn/ha and OFTP + 3.0kgMn/ha + 3.0kgZn/ha. SRI practices, rice varieties performed well and all the plant parameters studied were improved under the SRI method as compared to the traditional method. Beside this, rice variety Fakhre Malakand gave the best results in comparison to other rice varieties under the SRI practices. Similarly, the fertilizer treatments positively affected rice attributes and under combined application of fertilizers and zinc, all the rice yield attributes were improved [24].

CONCLUSIONS

Treatment of micronutriens addition to OFTP to increase yield paddy in Koto Tingga and Koto Panjang in Padang city with treatment is OFTP + 3,0kgMn/ha + 0kgZn/ha and OFTP + 3.0kgMn/ha +3.0kgZn/ha, and to increasing of yield 80 g/clump.

ACKNOWLEDGMENT

Authors would like to thanks Director of Research and Community Service Higher Education of Indonesia which gave fund for this research, also thanks to Research institutions and community service University of Andalas and which have facilitated this research activity.

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