# Status and Recommendations of Soil Nutrient Applied Technologyof Lowland Rice (Case Study in District Semidang Alas Maras, Seluma)

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## ABSTRACT

Rice is the most important agricultural commodities. The productivity of paddy in the Seluma District whichis a center of rice crops is still low. One effort that can be done to improve the productivity of applied technology is the application of site-specific recommendations. The purpose of the study was to obtain data and information on the status of N, P and K soil rice field and make recommendations applied technology in rice paddies. The benefits obtained by the recommendation N, P and K rice paddy more rational and efficient based on the nutrient status of the soil and can reduce the using offertilizers. The experiment was conducted in October until November of 2013 and located in Semidang Alas Maras, Seluma District. Methodologies used include: preparation, implementation of soil sampling, laboratory analysis, and preparation of recommendations applied technology. In practice, individual soil become composite, 1 composite soil sample consisting of 10-15 individual soil samples. The number of composite soil samples were taken by 10 composite soil samples, data from soil analysis assessed the levels of macro elements (N, P, K, Ca, Mg, Na, CEC,and KB), microelements (Al-dd, H-dd, soil texture ), pHH2O, pHKCl, and texture. The results ofthe analysis ofthe elements of Nas very low to very high with urea fertilizer recommendations 200-250kg /ha. Nutrients P classified as very low to moderate, with the SP-36 fertilizer recommended is 75-100kg/ha. K nutrients classified as very low to low with KCl fertilizer recommendations given was100kg/ha.

**Keywords**: nutrients, applied technology, rice paddy

## INTRODUCTION

Paddy field cultivated intensively will have depleted nutrients available in the soil. Yields in the form of stems, leaves, seeds, and roots that are transported out of the land brings with it nutrients contained therein. Without adequate returns in the form of nutrient input improver, such as fertilizers or soil, land productivity will quickly degenerate resulting in the growth of the plant for the next season will be even worse. Weathering of soil minerals is usually sufficient supply of nutrients to compensate for losses due to leaching, but not to transport the harvest.

Statistics Bengkulu Province (2014) expresses the amount of milled rice production in the province of Bengkulu counted until October 2014, dropped to 21 539 tonnes compared to the amount of production in 2013. This is due to decreased productivity and even reached 1.73 quintals per hectare, or decreased by 3.46 percent when compared to 2013. in 2013, production of dry milled grain rice (paddy) reached 622 831 tonnes, while in 2014 the amount produced only 601 239 tonnes. Seluma District is one district that experienced a decrease in productivity. In 2012, the district Seluma become the second-largest rice production center in Bengkulu Province, but in 2014 the District Seluma dropped to fourth after North Bengkulu, Rejang Lebong, and South Bengkulu.

ICM (Integrated Crop Management) paddy rice is an innovative approach for improving the efficiency of lowland rice farming by combining various technology components that support each other and with regard to the use of natural resources wisely in order to give a better effect on the growth and productivity of plants. Integrated Crop Management or ICM rice paddy aims to increase crop productivity in terms of yield and quality through the application of appropriate technology to local conditions (specific location) as well as protecting the environment. With the increase in production is expected to increase farmers' income (the Department of Agriculture. 2007).

Fertilizer recommendations based on soil tests for food crops, vegetables, and the plantation has not been established. Though less fertilizer application or excessive negative impacts such as crop nutrient, soil damage and environmental pollution (Al-Jabri, 2007).

This study aimed to obtain data and information status of N, P and K soil rice field and make recommendations applied technology in rice paddy in the district Semidang Alas Maras Seluma district.

## MATERIALS AND METHODS

The experiment was conducted in October - November 2013 located in the district of Maras Semidang Alas, Seluma District. Methodologies used include: preparation, implementation of soil sampling, laboratory analysis, and preparation of recommendations applied technology. In practice, individual soil sampling soil sampled composite, 1 composite soil sample consisting of 10-15 individual soil samples. The number of composite soil samples were taken by 10 composite soil samples, data from soil analysis assessed the levels of macro elements (N, P, K, Ca, Mg, Na, and CEC), micro elements (Al-dd, H-dd, soil texture ), pH H2O, pH KCl, and texture.

## RESULTS AND DISCUSSION

Nutrient Content Wetland area cultivated for rice crops in Sub Semidang Alas Maras all included alluvial type. Cultivation of rice in alluvial deposits normally use irrigation water technical and semi-technical. Some are cultivated in watery areas in inundation and some with seasonal inundation. The existence of technical irrigation system can make rice acreage planted more than once (Hakim *et al*. 1986). The results of the analysis of more soil properties are presented in Table 1.

The ability of the soil to hold cations is indicated by the value of Cation Exchange Capacity (CEC) with a high value of 50%, was 30%, and 20% lower. However, base saturation value of 100%, including very low, because the sorption complex is mostly occupied proton ($H^+$). The distribution of the value of CEC and base saturation is presented in Figure 1.

Table 1. Characteristics of soil wetland rice farmers in district Seluma

| Soil Properties | Minimum | Maximum | Average |
|---|---|---|---|
| Cation exchange capacity (me/100 gr) | 7.38 | 45.18 | 23.63 |
| Base saturation (%) | 1.00 | 4.56 | 2.00 |
| K provided me/100 gr) | 0.01 | 0.28 | 0.18 |
| Na provided (me/100 gr) | 0.23 | 0.65 | 0.49 |
| Caprovided (me/100 gr) | 0.93 | 2.58 | 1.72 |
| Mg provided (me/100 gr) | 2.78 | 14.63 | 9.62 |
| Organic Matter (%) | 0.86 | 37.12 | 7.77 |
| N Total (%) | 0.03 | 2.91 | 0.40 |
| C/N | 4.78 | 97.00 | 20.33 |
| P tersedia Bray I (ppm) | 3.82 | 12.57 | 7.09 |
| pH $H_2O$ | 4.92 | 6,01 | 5.41 |
| pH KCl | 4.42 | 4.92 | 4.69 |
| Al can be exchanged (me/100 gr) | 0 | 3.93 | 1.44 |
| H can be exchanged (me/100 gr) | 0 | 1.05 | 0.54 |

Based on the relative level of acidity, district of paddy soil Semidang Alas Maras slightly acid 40% and 60% acidic. According to Kim H. Tan (1992), the majority found that the soil cation exchange change with soil pH. At low pH, only permanent charge clay and some organic colloidal cargo hold that can be replaced by ion exchange of cations. Thus the relatively low CEC.

CEC value increases with increasing soil organic matter content, this is due to the contribution of functional groups generated on the mineralization process of organic matter in the soil. With organic fertilizer regularly and continuously, there will be the process of improving soil fertility in the paddy fields. Organic materials are directly providing macro and micro nutrients (Widya *et al.*, 2010).

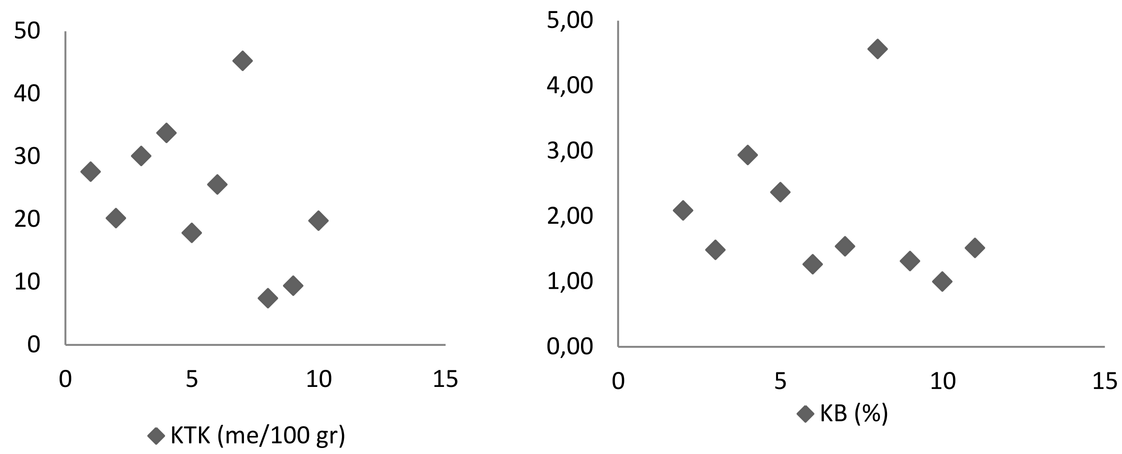


Figure 1. Distribution of the value of Cation Exchange Capacity (CEC) and base saturation (KB) Wetland Soil in District Semidang Alas Maras

Organic matter content ranged from very low to very high to very low composition of 20%, low 40%, moderate 10%, high 10%, and a very high 20%. C / N ratio for normal soils around 12. While in the paddy soil District of Semidang Alas Maras 2% have C / N is very low, 60% low, and 20% is very high. C / N with a low average is due to the lack of provision of compost in paddy fields. The distribution of the value of total N and organic matter and C / N is presented in Figure 2. The results of the elemental analysis of N is very low 10%, low 50%, moderate 20%, and a very high 20% with urea fertilizer recommendations are respectively 250 kg / ha (for very low nutrient status and low) and 200 kg / ha (for the nutrient status of the medium and high).

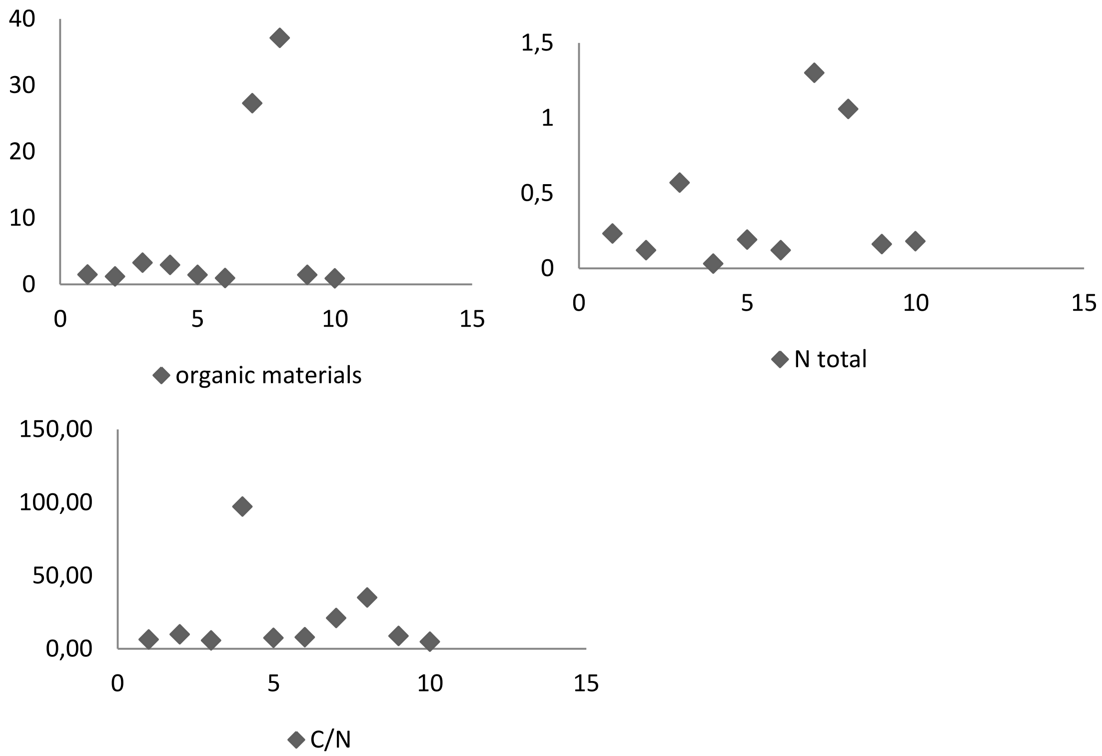


Figure 2. Distribution of the value of total N and organic matter

Very low available P content varied from very low to moderate with a very low value of 30%, lower 20%, and was 50% (Figure 3). With the P content is less available to plants. P rice plants that are needed to function as a growth promoter and the establishment will be a good rooting system so it can take a lot more nutrients and plant growth become healthier and stronger. Adding plant resistance to pests and diseases.

Accelerating the growth of plant tissue that forms the growing point of the plant. Stimulating the growth of generative plants are expedite the formation of flowers and ripening fruit / BJI to speed up the harvest. Enlarge the percentage formation of flowers into fruits and seeds. Nutrient P be one contributing factor to low productivity of rice crops in the district of Maras Semidang Alas. SP-36 fertilizer recommended is 100 kg / ha (for very low nutrient status and low) and 75 kg / ha (for moderate nutrient status).

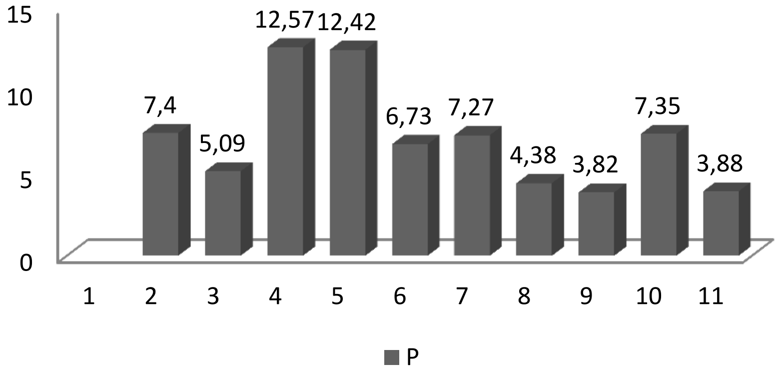


Figure 3. Content of P

Sodium (Na) provided 20% lower and 80% moderate. Calcium (Ca) provided 50% and 50% very low low. Magnesium (Mg) are 40% higher and 60% is very high. Potassium (K) are 10% lower and 90% very low. Fertilizer recommendations given was 100 kg KCl / ha. The benefits of nutrient Potassium (K) is expediting the process of photosynthesis. Stimulating the growth of plants at the beginning level of kink Reinforcing rods, thereby reducing the risk of easily fall. Reducing the speed of decay results during transport and storage. Adding plant resistance to pests, disease and drought. Improve the quality of results in the form of flowers and fruit (flavor and color) (Yunizar, 2008). With a low nutrient content, the lower the production of certain biases.

**Applicable technology**

Besides as identifier Integrated Crop Management (ICM) is the basic technology components easily applied and gives great influence on the increase in yield and income of farmers. In condition of specific option location technology components can be used as a component of basic technology. Basic technological components are: 1) the use of new varieties, 2) quality seed and labeled 3) fertilization based on the needs and soil nutrient status, 4) pest control approach, 5) setting the optimum plant population through legowo cropping systems, and 6) provision of organic matter through the return of the straw into the fields or the provision of compost or manure.

Component technology options including 1) the cultivation of land according to seasons and cropping patterns, 2) planting young seedlings (<21 days) in order to be more resistant seedlings, no stress due to revocation in the nursery, has a reserve of food material for the growth of the seed endosperm and nitrogen levels in higher leaf, 3) planting 1-3 stems per clump (save seed needs / ha, the number of seeds would increase competition between the seedlings in the same family, the seedlings die soon be embroidered later than 14 days after planting), 4) irrigation effectively and efficiently (irrigation with intermittent techniques, shift-sleigh, 'macak-macak', wet dry, 'glontor' shift, at flowering maintain the water level of about 3-5 cm until the harvest), 5) using the weeding hedge hog / 'gasrok,' 6) appropriate harvest time (90-95% of rice already cooked), and 7) threshing the grain as soon as possible (in the iles, slammed, combed, using a threshing machine).

## CONCLUSION

1. Analysis of nutrient N is very low 10%, low 50%, moderate 20%, and a very high 20% with urea fertilizer recommendations are respectively 250 kg / ha (for very low nutrient status and low) and 200 kg / ha (for the nutrient status of the medium and high). Nutrients P very low 30%, lower

20%, and were 50%, SP-36 fertilizer recommended is 100 kg / ha (for very low nutrient status and low) and 75 kg / ha (for moderate nutrient status). And K is very low nutrient and low of 10% to 90%. Fertilizer recommendations given was 100 kg / ha.

2. The technology used is applicable PTT application with basic technological components 6 and 7 components of the technology of choice.

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