CONTROLLING Fe WITH HUMID ACID OF VARIOUS ORGANIC MATTER SOURCES AND WATER MANAGEMENT AT RECENT PADDY SOIL THAT PLANTEDRICE CROP

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SUMMARY

Land use change from agriculture especialy ricefield into non-agriculture has decreased ricefield area. Therefore, it needs to create new ricefield. Unfortunately, land avalaible for that purpose is mostly classified as marginal land such as Ultisol and Oxisol having 86,56 ha (Noor, 1996). There will be a serious problem faced on recent ricefield at both soil types, that is Fe-toxicity problem such as addition of organic matter, however, suitable (correct) and aplicatitive technology has not yet been found. A technology that can be use to overcome the problem is the use of humid acid derived from various type of organic matter as will as water management

Controlling Fe-toxicity using water management can happen through leaching of dissolved Fe and oxidation of dissolved Fe^{2+} into insoluble Fe^{3+} continius water management during rice growth is expected to reduce the effect of Fe toxicity than controlling drainage can decrease Fe^{3+} and Mn^{2+} content in soil,increase macro nutrient uptake, as well as alleviate Fe and Mn content in plantissue. However the fixed interval of drainage is not yet found, therefor, it needs to study.

Humid acid has an important role improving soil fertility level, either in chemical, physical, or biologycal prosess. Humid acid can improve soil structure, increase water holding capacity, soil cation exchange capacity, and can decrease solubility of toxic elements such as Fe and Mn by formation metal-organo compex or khelation. Humid acid can be extracted prom plant residue, organic fertilizer, and various organic matter having been decomposed like peat soil, hay, manure, town waste and imperata. How mechanism of reaction from each humid acidity to overcome Fe toxicity, as well as the crop production and the trace effect needs to study. The last water management to reduce Fe solubility also need to find furthenmore, it also valuable to quantity if both factors were combined.

The most important long term objective of this research is to get break through technology in controlling Fe in recent paddy soil using humid acidity from various sourches of o4rganic matter and water management. In order to reach optimal production, specific objectives that would be reached on the 1^{st} year : (a) to find humid acidity content of composed various organic matter, (b) determine humid acidity ability in controlling Fe in recent paddy soil, (c) to study effect of water managemen in controlling Fe in recent paddy soil. Special objectives for the 2^{nd} and 3^{rd} year are : (a) to study the effect of humid acidity application and water management to controlling Fe and to increase rice production on recent ricefield, (b) to study the residue effect of humid acidity application on the Fe solubility and rice production on recent ricefield.

The 1^{th} year research was started with process of compositing organic matter (peat soil at sapric level, old chiken manure, town waste, hay and imperata) then, it was

continued with extraction humid acidity of each organic matter. Furtheremore, it was determine the character of the functional groups using infra red spectroscopy, analyzed the C and N content, as well as tested the ability in binding Fe using pure Fe in form of Fe_2SO_4.

Amount of Fe applied was 450 ppm Fe, humid acidity was 0-500 ppm within 11 level. Than humid acidity axtracted from all organic matter sources was applied into recent ricefield with was flooded for 6 weeks. Aplied was 0, 100, 200, 300, and 400 ppm using Complex Random Design with 3 replication. At the same time, research about controlling Fe at recent ricefield through water management was conducted. This research consisted of
4 treatment, thos were continuosly flooded, interval flooded (flooded and dried with, 7, 14, and 21 days interval for 3 mounth).

Based on result on the first year can provided several conclusion are : 1) content of humid acid follow peat soil about 3,2 %, imperata 2,6 %, hay 2,5 %, town waste 1,36 %, and manure 1,3 %, 2) the fifth ability of these source to reduce dissolved Fe are same of them, where on the treatment 500 ppm humid acid can reduce the content of Fe from 450 ppm to 50 ppm, in other word humid acid that formed equivalent with neutralized Fe, 3) in general, increase of humid acid treatment from fifth source of organic matter can reduce 400 ppm treatment of Fe on the sixth week is peat soil (665,998 ppm), town waste (674,981 ppm), manure (650,563 ppm), imperata (643,945 ppm), hay (563,754), 4) the

intermitten flooding with drying can reduce content of Fe^{2+} in recent ricefield. Increase of time flooding and drying, so that level of Fe solubility can decrease. Flooding and drying during 2 weeks can reduce the same content of Fe at 1250 ppm.

Based on this conclusion can advised the controlling Fe toxicity on the recent ricefield that rich of Fe combined between humid acid treatment compare with content of Fe had flooded with flooding and drying treatment during 2 or 3 weeks.

The second yea research is designed base on the result of first year research with title controlling Fe with humid acid from various organic matter sources and water management in recent paddy soil that planted rice crop in the green house to observate the growth and plant nutrient, also to observate Fe soil dynamic and plant production. The research using design factorial 2x3x4 with 3 replication which is placed as the split plot. The second year hibah compentation research (2006), obtained some following conclusion : 1) content of soil Fe that were continiusly flooded at various level humid acid (200,400,600 ppm), is appear quite similar that is about 900-1000 ppm, and it is stay still level toxicity for rice crop. 2) interval flooded at the same treatment humid acid from peat, imperata compost, and hay compostare able decrease the content of soil Fe, compare with the treatment which is flooded continiusly. The highest Fe content in the soil which is found with intermitten flooded without humid acid it is about 541 ppm, while Fe content in the flooded continiusly is about 1614 ppm. On the other hand intermitten flooded is able reduce the content Fe soil is about 1133 ppm, 3). Application humid acid until 600 ppm is not able to help reducing Fe soil content until content that is not toxicity < 125 ppm. With the lowest content is about 180-250 ppm, 4) a number rice child is able to increase cause of as appliying humid acid from peat, imperata compost, and hay compost either continiusly flooded or intermitten flooded is about 3-4 rice child and 2-5 rice child. Generally the growt of rice crop in the intermitten flooded is more better than continiusly flooded.