Cropping Pattern Rice-Red Onion-Soybean under Saturated Soil Culture in Tidal Swamp

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Indonesia has 20.1 million hectares of tidelands that could be used-land and for future agricultural development. The problem with tidal land is the presence of pyrite (FeS2), which, if dry (oxidized), causes the pH to fall and poisons Rice-Red Onion-Soybean crops. If the pyrite remains submerged (reduced), it will cause the appearance of iron (FeS2), which can be toxic to plants. Technology using Saturated Soil Culture can stop pyrite oxidation., increase soil pH and prevent iron dissolving, thereby increasing the yield of soybeans and corn 2-3 times compared to conventional methods.

Saturated soil culture is appropriate for rice and nonrice (red onion and soybean) because this technology reduces over-reduction for rice and over-oxidation for red onion and soybean. Crop rotation between rice, red onion, and soybean is a wise alternative to maintaining soil fertility. Crop rotation is the practice of planting different types of crops in rotation on one piece of land. Crop rotation is a cropping pattern that is carried out in rotation in a certain time sequence. Crop rotation provides abundant above- and below-ground crop residues and root exudates, which are known to stimulate the growth of soil microorganisms. Adding plant residues and manure to the crop rotation system can be a source of nutrients because it can increase the organic matter content of the soil.

The research was conducted on overflowing type B tidal fields, namely land that is only inundated during high tide in Mulya Sari Village, Tanjung Lago District, Banyuasin Regency, South Sumatra Province, Indonesia. This study aims to study: 1) observation of rice cultivation based on farmer interviews using adaptive varieties in tidal land, 2) Shallot cultivation with a water table depth of 20 cm water depth and shallot varieties that are tolerant to tidal land with water-saturated cultivation, 3 ) Soybean varieties that are tolerant to tidal land with water-saturated cultivation without fertilizer application. This research examines how the rice-shallot and soybean cropping systems take advantage of the residual effects of manure through water-saturated cultivation in tidal fields.

The highest rice productivity was in the Inpari 42 variety, which produced 4.2 - 4.5 ha-1, a tolerant variety in tidal areas. For the Ciherang variety, the initial growth was good, but after leaving, the panicle was attacked by Blast disease. And the sensitive variety in tidal land is IR64. This is based on interviews with tidal farmers that sensitive varieties experience Fe stress when the land is stagnant, causing Fe3+ to dissolve and oxidize pyrite quickly and decreasing soil pH.

The red-onion production on Saturated Soil Culture (Table 1). The treatment of the Bima Brebes variety at a water depth of 30 cm is higher in yield than other shallot varieties. Statistically different markedly, the Bima Brebes variety, with a water depth of 30 cm, can reach 7.3 tons/ha. At the same time, the lowest productivity with water depth in the water-saturated cultivation system in tidal land is the SS Sakato variety, with a water depth of 10 cm. The productivity of shallot crops with water-saturated cultivation is the Bima Brebes variety, with a water level height of 30 cm. This happens because water-saturated cultivation causes soil conditions at field capacity conditions. The stability of subsurface water at the beginning of growth until it enters the generative phase can meet the formation of onion bulbs in water-saturated cultivation in tidal fields.

Tabel 1. Productivity Shallot (ton/ha) in saturated soil cultures of varying water depths

|  |  |
| --- | --- |
| Water depth (cm) | Shallot Varieties |
| Bima Brebes | Bauji | Manjung | Tajuk | SS Sakato | Batu Ijo |
| 10 cm | 5,2 de | 4,6 def | 4,3 ef | 4,6 def | 4,1 f | 4,3 ef |
| 20 cm | 6,2 bc | 5,5 cd | 5,2 de | 5,0 def | 5,0 def | 4,6 def |
| 30 cm | 7,3 a | 6,0 bc | 6,5 b | 6,3 b | 5,2 de | 4,8 def |

Remarks:  a,b,c,d,e,f It should be noted that values in rows and columns separated by different letters differ significantly (DMRT test, 5%).

Productivity of 7.3 tons/ha in shallot varieties carried out with water-saturated cultivation technology means that the development of shallots with the BJA concept in tidal land is very promising for future development. Of course, it is also assisted with mechanization technology in light tillage and the construction of irrigation ditches.

Table 2. Soybean productivity

|  |  |
| --- | --- |
| Treatment | Productivity  |
| Variety |
| Anjasmoro | 2,09 b |
| Tanggamus | 2,57 a |
| Fertilization Combination |
| No Fertilizer | 0,99 b |
| P | 1,38 b |
| P+K | 1,33 b |
| P+K+Ca | 2,36 a |
| P+K+Ca+Pupuk Kandang | 2,42 a |
| P+K+Ca+Pupuk Kandang+Cu | 2,62 a |
| P+K+Ca+Pupuk Kandang+Zn | 2,94 a |
| P+K+Ca+Pupuk Kandang+Cu+Zn | 2,93 a |

Remarks:  a,b,c,d,e,f It should be noted that values in rows and columns separated by different letters differ significantly (DMRT test, 5%).

Ca plays a role in increasing soil pH. An increase in soil pH causes nutrients to become available. The amelioration process by lime/dolomite supplies OH- into the soil, which reacts with H+ to become water and causes H+ ion levels to decrease so that soil pH increases.

**Key words:** Cropping system, saturated soil culture, Rice-Red Onion-Soybean, tidal swamp

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