POTENTIAL OF FLOATING HORTICULTURE SYSTEM ON SWAMPLAND IN SOUTH SUMATRA

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ABSTRACT

Farmer used to grow rice on swamp land when water level is decreased to about 20 cm, the planting time usually occurs on June and harvesting on August each year. Floating horticulture might be better than draining the soil, and may introduce to the farmers in swampland during flooding. Based on the field investigation to 21 farmers as correspondences in swampland rice field, it was showed that all farmers cultivated their land for rice only and once a year. Their face some problems during nursery and planting, and the farmers said that the biggest problem was caused by flooding. They have to planting again for nursery and delay planting paddies. They do nothing to their farms during flooding. Floating horticulture may introduce to the farmers in swampland during flooding to overcome this problem. Floating agriculture has been practiced by farmers in Bangladesh and Myanmar since along time ago (three to four hundred years).

It is one of good agricultural practices, because floating agriculture is 100% organic, provides double production than land based farming practice, is less than ¼ of the cost of comparable agriculture, is fully free from fertilizer and has a outsized amount of carbon sequestration power and thereby creates wise use of intensifying waterlogged and wetland areas through turning out a enormous problem to potentiality as a climate change resilient farming practice and when production becomes unsuccessful, it generates a large amount of compost for multidimensional use. Floating horticulture may be suggested during flooding, but needs more researches and practices before applying this method.

Keywords: Floating horticulture, Swamp land

INTRODUCTION

Farmer used to grow rice on swamp land when water level is decreased to about 20 cm, the planting time usually occurs on June and harvesting on August each year. So they cultivate their farms only for three months in a year. Farmers do nothing to their farms for about 9 months, this is because of high water level. Thus they have plenty of time during flooding from November to May.

Drainage system can not really overcome this problem, because there are acid sulphate and potential acid sulphate soils in some places. Then when the land was dried, the plant could not grow. Drainage also could make water level down drastically, thus plant might stress water before ripening.

Floating horticulture might be better than draining the soil, and may introduce to the farmers in swampland during flooding. Floating agriculture have been used in some places in South Sumatra for seeds germination only, by using bamboo or banana tree. Research of growing vegetable was done by Safrullah, 2008 by using rubbish of plastic glass, but I think it is not recommended because it is not friendly to environment. It might be good to use bamboo or banana tree, however it needs some experiments to find out which one can be adapted by farmers in lowland ("lebak").

Floating agriculture has been practiced by farmers in Bangladesh and Myanmar since along time ago (three to four hundred years). In Myanmar, farmers grow paddies and tomato (Uga, 2010) and in Bangladesh they grow okra, cucumber, snake gourd, spinach, aurum, spices and several other vegetables (Assaduzzaman, 2004).

It is a useful method considering the economical, environmental and as well as social aspects. The production rate is high from this kind of agricultural practice. Farmers have been
practicing the method mainly for two reasons. First, during monsoon, when most of the land is flooded, floating agriculture is the only alternative method of cultivation. Second during the winter season, farmers carry the floating bed to higher grounds where they break it and mix it with the soil to enrich the soil (Assaduzzaman, 2004). Eventhough, there is no winter in South Sumatra, but the way of breaking and mixing the bed can be done during dry season for enrichment of the soil for paddies.

The purpose of this writing are to explain some potentials of swampland in South Sumatra and what considerations have to be taken into account if farmers want to adapt floating horticulture method on swampland.

MATERIALS AND METHOD

Agriculture on Swampland

This field investigation was carried out in April 2010 and 21 farmers was selected randomly, some questions were asked especially about how they deal with the flooding. The purpose of investigation was to find out what’s the problem they face during nursery and planting. Based on the field investigation to 21 farmers as correspondences in swampland rice field, it was showed that all farmers cultivated their land for rice only and once a year. Their face some problems during nursery and planting, and the farmers said that the biggest problem was flooding, as showed in table below:

Table 1. Some problems of paddies cultivation on swampland

<table>
<thead>
<tr>
<th>Amount of Farmer</th>
<th>Date of Paddies Seeding (Nursery)</th>
<th>Nursery Problem</th>
<th>Date of Planting</th>
<th>Problem of Planting</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 person</td>
<td>April or 3 weeks before planting</td>
<td>flooding, seeding dead, seeding too old, reseeding</td>
<td>May or June</td>
<td>Flooding, No fixed time, Delayed Planting, Shell and rat attacked, Drying drastically if dead no replanting</td>
</tr>
</tbody>
</table>

So farmer used to reseeding again for nursery, that mean they have to spend the money again for this. This problem occurred this year because the water level are still high and nurseries are already more than 3 weeks. According to Department of Agriculture (2008) the age of nursery was not suggested more than 21 days, otherwise the plant growth and yield would be low.

One of the ways that could solve this problem is to grow seedling using floating method and farmer also have to change the time of seedling and nursery, because of flooding season becomes later than used to be. Planting time was also depended on water level, when it was still high thus farmers delayed planting. Some times paddies were submerged after planting because of rain and tide, and it may fail harvesting in some area.

Because of flooding problem, farmers need to change the time of nursery and planting, the method of planting, and may be growing another crops such as vegetables on floating raft to add more income.

Potential of Swampland

There are 4 types of lowland paddy field in South Sumatra, such as: irrigated, rain fed tidal swampland, and fresh water swampland. The acreage of fresh water swampland have cultivated for rice once in a year are about 184.079 ha, twice a year are about 6.708 ha, and have not cultivated yet are about 106.113 ha. Thus there are still a lot of lands available; however because of flooding it is difficult to grow rice twice in a year.

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Table 2. Type of cultivated paddy field and the acreage

<table>
<thead>
<tr>
<th>Type of Paddy Field</th>
<th>Once Planted per year</th>
<th>Twice Planted per year</th>
<th>Not Planted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Irrigated</td>
<td>11.061</td>
<td>72.729</td>
<td>5.462</td>
<td>89.252</td>
</tr>
<tr>
<td>2. Rainfed</td>
<td>51.512</td>
<td>32.168</td>
<td>30.868</td>
<td>114.548</td>
</tr>
<tr>
<td>3. Tidal Swampland</td>
<td>147.014</td>
<td>6.862</td>
<td>47.425</td>
<td>201.301</td>
</tr>
<tr>
<td>4. Fresh water Swampland</td>
<td>184.078</td>
<td>6.708</td>
<td>106.113</td>
<td>296.899</td>
</tr>
<tr>
<td>Total</td>
<td>393.865</td>
<td>118.467</td>
<td>189.868</td>
<td>702.000</td>
</tr>
</tbody>
</table>

Source: Subiksa dan Ratmini, 2008.

Based on hydrotopographical, there are three zones on swampland which are traditionally called "Lebak Pematang = Levee, Lebak Tengahan = Medium Swamp, and Lebak Dalam = Deep Swamp" (Figure 1).

![Figure 1. Zones on Swampland](image)

Farmers usually plant paddies are based on how low the water level, the first time they plant paddies on "Lebak Pematang", the second is on "Lebak Tengahan" and the third is on "Lebak Dalam" accordingly. Due to different in planting time, farmer also harvest in different time. This way of cultivation has been done by traditional farmers since their ancestors and it seems environment friendly. Some farmers never give fertilizer to the paddies field, thus the source of plant nutrients are depending on flooding water from big rivers i.e. Musi, Ogan, Komering, and Lematang, which always flood during monsoon from December up to March. Sagala, 2002 analysed water in swampland and the results showed that pH of water was acid (pH 4) or very acid (pH 3) during low water level. But the pH of water will be about neutral (pH 6) during flooding. Farmers used to say that acid water was leached by flooding. Thus water quality will be good during flooding and it may contain enough nutrients and neutral pH. That's why it is possible to practice floating horticulture in the swampland. Analysis of soils from waterlogged area (Naning, et.al., 2008) showed that soils contain high organic matter (from 2.74% to 17.43%), pH about 5.0; (N, P and K nutrients from very low to medium); and the depth of pirit from from 60 cm to more than 120 cm. Thus applying floating agriculture can be based on the depth of pirit. It may not suggest when pirit is <60 cm deep, however when flooding is deep enough and fresh water has replaced acid water this means floating horticulture can be applied on this location.

Floating Agriculture

This type of agriculture system was flood coping strategy, sustainable development, popular and effective method with traditional/indigenous knowledge and practices in Bangladesh (Assaduzzaman, 2004).
Author reported that in the monsoon (mainly during June-August), farmers cultivate ladies finger (okra), cucumber, snake gourds etc. on the floating system. After the monsoon, farmers use this for cultivating spinach, aurum, spices and several other vegetables. During the monsoon, farmers use small boats to manage the floating agricultural land. Second during the winter season, farmers carry the floating bed to higher grounds where they break it and mix it with the soil to enrich the soil. To prevent further pollution and eutrophication in the lake, more sustainable agricultural practices will be encouraged. Farmers were organized to abandon chemicals and fertilizers in order to demonstrate sustainable agriculture and the long-term benefits related to it. Organic farming was introduced and demonstrated in 2 villages, Sitlar and In-u, focusing on rice paddies and tomato.

Proposed Activities by Assaduzzaman, 2004:

- Selecting the most dedicated among the volunteer farmers who own suitable and enough land areas
- Training of these farmers by an expert in agrofarming and one supervisor
- Demonstrating the organic farming practice and supervising the whole project period
- Encouraging use of organic fertilizers and pesticides by providing sufficient information
- Differentiate benefits and profits between organic farming and seasonal, traditional farming
- Demonstrate best practices to surrounding communities

![Image](image.png)

Figure 2. Floating agriculture in Bangladesh (Photo by Barchik)

Thus according to Assaduzzaman (2004) floating agriculture which is 100% organic, provides double production than land based farming practice, is less than ¼ of the cost of comparable agriculture, is fully free from fertilizer and has a outsized amount of carbon sequestration power and thereby creates wise use of intensifying waterlogged and wetland areas through turning out a enormous problem to potentiality as a climate change resilient farming practice and when production becomes unsuccessful, it generates a large amount of compost for multidimensional use.

The way of making floating bed by Intha people in Myanmar according to Tan, 2007 were:

- The floating islands were formed from coarse grasses reeds sedges and grasses, reeds, sedges, other aquatic vegetation.

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- They were sawn into blocks of 2 m wide and up to 180 m long.
- The floating islands can be used up to about 15 years or as long as the submerged mattress.
- Black silt from the bottom of the lake was carried by flat boats and spreaded over it to the extent the bed was not sunk but still floating.
- Adverse effect was the floating beds become solid ground

Based on the above explanation, there are a lot of potential to apply floating horticulture on wetland areas in South Sumatra, because of length of flooding is more than 6 months and the depth of water are >20 cm to >1 m during flooding. However, it needs more researches on how to make floating bed and to make organic medium on it and never use non organic material on wetland area.

CONCLUSIONS

1. Flooding has caused delay in planting paddies and replanting seed again for nursery.
2. Farmers do nothing to their farm during flooding, this means no activity on wetland area.
3. Floating horticulture are applied less fertilizer and used organic materials, thus it's environment friendly.
4. Floating horticulture may be suggested during flooding, but needs more researches and practices before applying this method.

REFERENCES

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