

Microbial Powder

Challenge

Irrigated rice, planted multiple times throughout the year, has a short window, three to five weeks, to prepare land between crop cycles. Given limited time, many farmers resort to burning rice plant residuals to accelerate decomposition. The burning of rice residue post-harvest is one of the main contributors to air pollution in the Greater Mekong Subregion. In addition, farmers rely on increasingly expensive chemical fertilizers to ensure rice yields in this intensive system. Use of chemical fertilizers have negative effects on both environmental and human health, as well as reduce overall profit margins for farmers.

Solution

Products that use microorganisms to decompose organic biomass and produce beneficial bio-extracts provide a solution to both burning and chemical fertilizer use. Microorganism decomposition can fully decompose rice stubble in about 3-5 weeks, corresponding to the timeline of land preparation for irrigated rice, eliminating the need to burn agricultural residuals. The bio-extract produced by the decomposition helps to restore soil health and provide a natural source of nutrients for plants, reducing the need for chemical fertilizers.



Adaptation and Mitigation

Microbial products support both adaptation and mitigation measures. The bio-extracts help plants adapt to the changing climate by improving soil health and resilience. By enhancing plant growth and productivity under stress conditions, microbial formulations ensure stable food production even as climatic conditions vary. Farmers refraining from burning directly reduces GHG and PM2.5 emissions. Additionally, the microbial activity increases the content of organic matter in soils, which traps carbon in the soil and acts as a carbon sink.

Business Model

There are a few products available in Thailand at present, offered by both public and private sectors. Thailand's Land Development Department has the

capacity to produce up to three million packets per year, whilst private brands such as SAS's Soil Digest can produce up to 1,680,000 packets annually. RAIN is currently assessing all products on the market to support scaling of products to farmers in Thailand and the region.

Expected Income Gain for Smallholder Farmers					Notes
	Burn	Tractor	Microbial		
Challenges	Illegal Unhealthy Dangerous	Availability Small plots Uneven land	Awareness		
per rai					
Yield (kg)	828	900	1,008		Estimated 12% yield increase
Price (THB)	10	10	10		
Revenue (THB)	8,280	9,000	10,080	1,080	Compared to tractor
Cost (THB)	-	350	120	230	Average price of microbial products
Fertilizer (THB)	1,600	1,600	1,150	450	
Soil Quality	Worse	Good	Great	Priceless!	
Air Quality	Bad	Okay	Great		
			Income Gain	1,760	
				per rai	

USDA Thailand Regional Agriculture Innovation Network (RAIN) project, funded by United States Department of Agriculture Food for Progress and implemented by Winrock International, strives to facilitate adoption of 30 climate smart innovations by 30,000 farmers. For more information, visit <https://winrock.org/project/using-tech-to-support-thailands-transition-to-climate-smart-agriculture>.