

Agricultural Burning Management in Thailand

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Air pollution from particulate matters in Thailand has many causes. The impact from the problem will be increased during November to February, especially during the warmer months after the cold air mass moved out of the country and in February, which is a transition from winter into summer when the air is stagnant. This period is also an agricultural harvesting season, which would follow with burning in the cultivated lands and is seen as one of the core reasons of the problem.



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Open burning in the agricultural areas is part of the PM_{2.5} problem

Thailand has cultivated areas for economic crops across its regions. Many farmers aim to increase crop yields. Therefore, they would accelerate the production for several cycles within a year without proper management. Many choose to burn the agricultural residues as it is a convenient way and cost saving, especially burning of sugarcane leaves, rice stubbles and straws, and corn stubbles.

The burning is mostly occurred in off-season rice farms, which accounts for 57%, then followed by sugarcane farms 47%, maize farms 35%, and wet-season rice farms 29% of the total burned areas. (Attavanich and Pengthamkeerati, 2018)

The burning in agricultural areas mentioned above has become an obvious source of particulate pollution, especially after harvesting and during soil preparation. There would be flames spread in the fields and the dust and soot spread throughout the areas. Pollution Control Department (2018) pointed

out that open burning from agricultural area is causing PM_{2.5} and accounted for 5% of the total PM_{2.5} generated. Other sources include cars and traffics 72.5%, industrial factories 17% and others.

“The farmers still believe that burning helps in pest control and makes it easier to till the soil. Although some machinery assistance for soil preparation and harvesting are available, however the machines are costly and create a burden on maintenance. Therefore, the burning in agricultural area is practiced often” consistent information given by several local authorities.

“Burning of sugarcane leaves is necessary before harvesting, especially before plowing the soil otherwise it will be difficult. Anybody has a chopper; they will plow 2-3 times. The medium to large landowner farmers would have the machine, but the smallholders don’t have that, so they have to burn” some farmers have this mentality.

The alternatives to reduce and reject burning

All types of crop residues can be used or developed by utilizing research and innovation for value added. Some farmers use these residues to cover the base of the trees or vegetable plots to preserve the moisture and microorganisms, and when decomposed, it can be fertilized of the plants. Some use the residues to produce organic fertilizer or animal feed e.g. fermenting corn husk to make cow feeds, making straw bales to feed cattle, etc. Furthermore, rice

straws and sugarcane leaves can also be used to produce biomass for sugar factory.

Ban Jang Ngam Large-scale Agricultural Group from Suphanburi province explains *“Currently the farmers in the group would not burn sugarcane leaves, but compress the leaves and sell to Mitr Phol factory at Danchang district for 1,000 Baht per ton. The factory will use as biomass. And this can generate more income to the farmers”*.



Photo by: images.app.goo.gl/KEEhuMVd6wKAip1B7

Similarly, the Large-scale Rice Farming Group at Ban Pan sub-district, Phra Nakhon Si Ayutthaya province has reported *“the group has involved in a project of SCG company to buy rice straw from farmers in order to reduce burning and use this as renewable energy in the cement factory. The sell price is 1,000 Baht per ton, which is better than burning off”*

In addition, some are using rice straws as a material for cultivating mushrooms to increase income. It can generate substantial income for most of the year, but it has a limited number. The residual material from mushroom cultivation can be returned to maintain the soil quality and also reduce the cost of fertilizer.

There are many other good practices initiated by farmers to reduce burning in cultivated areas. These practices such as **rice straws and stubbles** can be plowed to make green manure to restore the soil,

making straw bales for animal feeds, or sell to generate income, or use to cultivate straw mushrooms and make a mushroom house from rice stubbles and straws. As well as adding nutrients into the straw to make ruminant feeds or making furniture.

For **sugarcane leaves**, farmers will compress it to make a bale and sell it to the sugar factory to use as biomass in their power plant, or chop and mix the leaves with soil and let them decompose as natural fertilizer. Some may also use the leaves as soil cover.

The **corn trunks, cobs, and leaves** can be used to produce organic fertilizer by tilling to accelerate decomposition. Making compost from corn cobs helps to reduce the cost of fertilization in the next season. Furthermore, farmers can make corn leave pales or adding nutrient for animal feeds and so on.



Photo by: Suphan Buri Field Crops Research Center (2020)

Adopting burning free practices is gradually expanded. There is a burning free sugarcane management, starting from selection of sugarcane varieties which leaves are easy to fall off, using fresh sugarcane harvester to replace human labor, or clearing the leaves before harvesting when there is no harvester to reduce cane falling. After sugarcane harvesting, the leave chopper will be used in between the rows of cane stumps to plow the leaves and other residues into the soil to make the stumps better germinate, provide high yields as well as can be restored for several years. If there is no chopper, the

leaves will be cleared to cover the soil and then plow together with adding microorganisms or bio-extracts to accelerate decomposition.

If eco-friendly production is promoted within the factories such measures would expand burning free agricultural practices to be faster. For example, sustainable pollution control, conservation of natural resources, including supporting some budgets or reducing interest rate on the loan for farmer to purchase machinery e.g. fresh sugarcane chopper, big tractor, etc. in order to reduce burning.

Sustainable burning management

Burning management in paddy, maize, and sugarcane farms is associated with more than 20 million Thai farmers nationwide. Clear rules and regulations with effective enforcement are required, including collaborations on the ground to encourage intensive management, facilitate local regulations which is issued by the local administrative organizations. These can be another alternative to allow problem solved according to the local contexts to prevent repetitive problems especially on areas with sugarcane, paddy, and maize farming that often found burning in the production process.

In case that the burning is needed, it must be organized with a burning plan and the results should be reported to the local authorities. Besides, sugarcane farming system management should be designed to allow the machine or fire truck to easily access. However, there should be the zero burning areas determined with effective law enforcement for the areas with high impacts such as near the community settlement, hospital, school, etc.



Ban Jang Ngam Large-scale Agricultural Group, Suphanburi province recommended *“there should be a big gap in pricing between fresh and burned sugarcane to provide incentive for farmers to produce fresh sugarcane for the factories”*.

Photo by: TEI

Principles for prevention, control, and reduce burning

- **Burning prevention** through campaign and promotion of burning free agricultural practices as well as promotion of eco-friendly production along with supporting appropriate technology in agricultural sector to replace burning.
- **Burning control** with together planning and informing relevant authorities. Including, farming system management to allow machinery to easily access or determine zero burning areas and effectively enforcement of the laws as well as control and place restrictions to the high risk areas and nearby areas.
- **Utilization of agricultural residues** refers to all types of agricultural residues, through innovation development to add value towards circular economy concept and facilitation of marketing platforms.
- **Burning reduction** requires the mechanisms, regulations on the ground, as well as local regulations, fast moving unit for prevention and monitoring with provincial burning management center as a joint administration and command, etc.

Applying the above principles still takes time. Although some farmers have begun the change of production practices which may not be able to expand much currently. However, it can build confidence within the society to see that the agricultural sector is not neglecting to PM_{2.5} problems. Even though it is not the main cause of the problem, but it is an opportunity for government agencies to take on the lessons and actively promote in order to contribute the solution more quickly.

Behavioral change to prevent and reduce burning in agricultural areas is a big challenge. It is not quick or make happen in a short period of time. This is because most farmers are smallholders, rely on human labors and have small income. Therefore, applying large machinery and technology to replace burning may create more burden to these farmers. The support should be stepwise and may require punishment measures. If the burning from these economic crop cultivation areas can be managed, some reduction of PM_{2.5} would be resulted.

Sources:

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