Integrated Bio-Cycles Farming System for healthy Food and Food sovereignty during Pandemic of COVID-19

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Since WHO established COVID-19 as a pandemic, many countries have maintained calm downs, soft downs, and lockdowns. To prevent the spread of the virus more widely, by avoiding crowds of people. The Indonesian government also applies large-scale social restrictions (PSBB) to various areas of the pandemic red zone. Business, industry, production, education, restaurant, worship, performance, art, travel, sports, tourism are suspended, and Work from Home (WFH) is implemented. Both lives and livelihoods are at risk from this pandemic. Agricultural harvest and meat products at the beginning of the lockdown due to the COVID-19 pandemic made abundant stockpiles, and prices fell below the production price. The next food production cycle is hampered due to the dry season, lockdown, and declining business prospects. The food supply chain is a complex web that involves producers, consumers, agricultural and fishery inputs, processing and storage, transportation, and marketing. Tropical ecosystems have an essential role in global climate change, biodiversity, life cycle, healthy food, food production, food safety, food sovereignty, food supply chain, bioeconomic, environment, social culture, and environment (Agus, 2018). Indonesia has an advantage as an "equatorial emerald" with the highest natural productivity in the world, about ten times compared to temperate regions because it is supported by high temperatures, rainfall, humidity, sunlight, and organic cycles year. Integrated bio-cycle farming system (IBFS) can become a new superhero sector of the national economy in managing the community-based, superior land (soil, water, air) and biological (animal, plant, and human) resources (Agus, 2018). Farmers who are food producers, which make up 70% of Indonesia's population, are highly dependent on the food industry. The strategic efforts towards food sovereignty of the Government of Indonesia through the Nawacita program are quite reasonable but are still conventional. Covid-19 and hydrometeorology disaster mitigation due to global climate change must be anticipated and mitigated. Modern nano-biotechnology is expected to be a big leap to produce food efficiently and effectively in the future. The government must also provide agricultural machinery technology assistance; subsidize agricultural inputs, price subsidies, tax exemptions, and agricultural insurance. Indonesia will be able to become a full food sovereignty country if agriculture as an integrated village development locomotive is managed from upstream to downstream synergistically and well.

Material and Methods

Research series on the integrated bio-cycles farming system and food sovereignty were carried out with in-situ and ex-situ. The primary and secondary observation data are carried out to formulate a national strategy of food sovereignty. The in-situ research series is carried out in the Papua, while the ex-situ research is carried out in the Laboratory of UGM Yogyakarta Indonesia. This research design applied a qualitative approach and used a descriptive analysis method in generating research phenomenon to understand some aspects related to the research topic. The collected data were analyzed from the perspective of the needs for policy direction and program intervention.

Results and Discussions

Food Security and Vulnerability Atlas (FSVA) of Indonesia 2015 categorized the vulnerability to food and nutrition insecurity based on nine indicators covering food availability, food access, and food utilization. Indonesia's Law No. 18/2012 defines food security as the condition in which all people, in all households, at all times have sufficient food in both quantity and quality to enable them to live healthy, active, productive and sustainable lives, and that the food is safe, diverse, nutritious, equitably distributed and affordable, and does not conflict with religion, beliefs or culture.

Anticipating a food crisis because of the coronavirus outbreak [COVID-19], the Government of Indonesia prepare 255.000 hectares of peatland in Central Kalimantan as new rice fields and requires 300,000 smallholder farmers. Clearing peatlands for food production is still very risky, as was the failure of the one-million-hectare paddy field project in Central Kalimantan in the 1995. Draining and wetting of peat soils make humic acid released, which is hydrophobic and more acidic, flammable when dry, and difficult to absorb water again and floods when it rains (Agus et al., 2020). Drying causes fires, high carbon emissions, and impacts on global climate change, the dissolution of highly acidic pyrite makes peat more acidic, thus impacting the degradation of the local, regional, and global environment. Drying also causes pests such as rats, uret pests, ants, fungi, etc., which results in crop failure. Peatland management is a risk, and prospects for harvesting are poor. Farmer labor is increasingly difficult and unfamiliar, some limiting peat factors, so that many fail to harvest, even if with high subsidies as well. It is costly to repair peatland degradation that has been continuously damaged, but technology has not been mastered and lasts very long. Energy, costs, and high technology have not all been mastered, so they are likely to fail again, potentially but have the potential to harm environmental, economic, socio-cultural aspects, not only locally but regionally and globally (Agus et al., 2020). Developing of new rice fields should be done in abandoned areas and marginal areas. The process of forming land into rice fields takes over three years, even up to 12 years. To increase food production, the government must pay attention to many things, such as intensification with agricultural technology innovation or food diversification. Indonesian food culture is not only based on rice, but also can be sago, tubers, corn, and other carbohydrate sources.

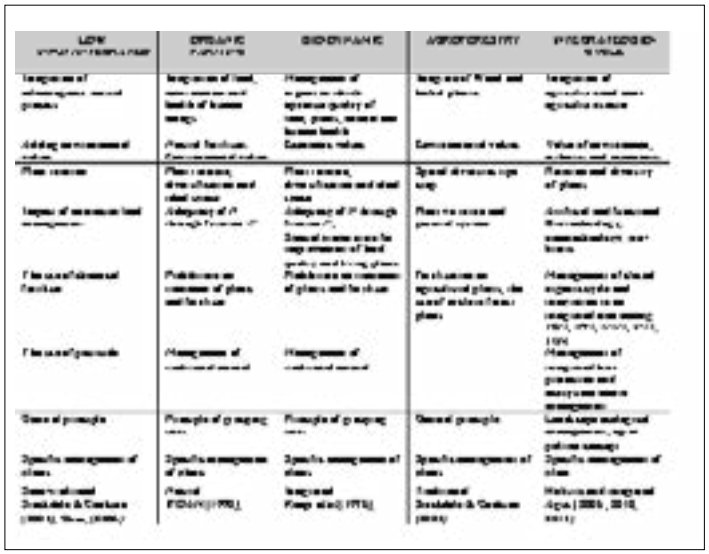

Figure 1. Development of Integrated Bio-Cycles Farming System and key characteristics of a various sustainable agricultural system

The Merauke Organic Food Program in Papua by the National Food Sovereignty Foundation (YKPN) to realize Merauke as a world food barn has been successful. The development of the integrated bio-cycles farming system on critical lands and peatlands in Indonesia is carried out with the development of intensification and mechanization by superior biofertilizers, breeding of superior hybrid rice seeds, soybeans, and corn, as well as transportation energy and other machinery. Off-farm development is also carried out through information-communication technology (ICT) based warehouse receipt systems, the Fostering a Prosperous Family (MEKAR) program, micro-small entrepreneur capital, food estate. Rice production increased dramatically from 1-2 tons/ha to 8-10 tons of dry grain harvest (GKP)/ha.

Conclusions: Anticipating a food crisis because of the coronavirus outbreak [COVID-19], the development of integrated bio-cycles farming system by intensification and mechanization on and off-farm innovation by superior biofertilizers, breeding of superior hybrid rice seeds, soybeans, and corn, as well as transportation energy and other machinery.

References

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