

Environment Friendly Agriculture and Organic Agriculture in Vietnam

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Summary: Agricultural systems to achieve Environment friendly objectives, including improved food security, conserve biodiversity as well as integrated Pest Management with increase yield sustainable. Biodiversity makes a significant contribution to the national economy, providing a basis for ensuring food security. The necessary for producing organic products has taken care not only for human health but also for sustainable development natural resources. Organic farming is a system of managing agricultural holdings that implies major restrictions on fertilisers and pesticides. Organic farmers realized additional had made the degradation and erosion of land. In order to achieve successful pest management in organic farming, the development of ecologically, appropriate pest control systems for each crop by own care and with purpose of protects own land and products. The obtained results show that using agro-ecological approach help to considerably increase the crop yield and reduce the soil erosion and to diversify farmers' income options in cropping systems while conserving, improving natural resources and environment. Biodiversity conservation and food production need to be balanced. Information used in this report is derived from published documents by different ministries, institutes, national/international organizations, proceeding, paper. Reports to provide the about benefits and needs to develop a sustainable organic agriculture for the country through greater efforts in research, training, planning and extension activities, then concludes with some situation and development orientation for organic agriculture and safe foods in Vietnam. Arose Questions are how to develop agricultural sector to ensure food security. Organic farming should be regarded as a friendly farming system.

Keywords: Organic, Agriculture, Vietnam, Enviromental, Biodiversity

1. Introduction

Vietnam has a tropical monsoon climate, due to its location along the coast, the climate in Vietnam is regulated partly by sea. Annual rainfall volume of 1200-3000mm/year and temperatures ranges from 5°C to 37°C. Vietnam has tied the waters of about 226,000 km² coast and has a dense river system, to about 2,360 large and small rivers and channels with dense river system brought abundant fishery resources, abundant hydropower potential, facilitate agricultural development. Agriculture plays an important role for sustainable land use and appropriate natural resource management in Viet Nam as more than 70 per cent of the total population is a farmer. Most Vietnamese households depend on agriculture. Vietnam has two biggest agricultural areas which support agricultural products for whole country, as Red River Delta 15000 km² wide, and Mekong River Delta 40000 km². The main agricultural products of Vietnam by years are rice, coffee, cocoa bean, vegetable, tea, silk ... (Nguyen *et al.*, 2013), however paddy rice is the major crop. Wide rapid development of agricultural technologies has signifcantly increased the amount of agricultural products. However, the majority of farmers have come to apply agricultural chemicals, such as chemical fertilizers, herbicides or pesticides to maintain high levels of crop yields. The overuse of agricultural chemicals has damaged many aspects of natural resources as caused environmental degradation through soil rosion, increases in salinity, and water pollution from agricultural chemicals, the governments, non governmental organizations and farmers have begun cooperating on the development of Environment friendly agricultural systems. Vietnam's Environment friendly agriculture does not depend largely on so-called traditional knowledge for the management of land and wildlife especially agriculture and conservation of biodiversity, can be more organic Agriculture, decrease their environmental impact and conserve biodiversity. Organic agriculture encourages living together in large extent, not only on the same field where even the vicinity. The more the plants, animals and other living organisms in different soil tillage systems are there more creatures help maintain soil fertility and prevent pests. Biological diversity will help the organic production environment capable of producing healthy products in an ecological balance.

2. Diversity of Species

Vietnam is one of the countries with high diversity of fauna, floral and microorganism species. In the country's terrestrial ecosystems, more than 13,200 floral species and about 10,000 faunal species have been identified. More than 3,000 aquatic creatures have been identified in the interior wetlands. The tropical marine with more than 20 typical ecosystems (Ministry of Natural Resources and Environment (2014). Since the 1990s, Vietnam has successfully focused on increasing production in both area and intensity. However, this has come at the expense of reduced quality, reduced biodiversity, polluted water supply and degraded soil and environment; The government is restructuring the agricultural sector with the objective of enhancing added value for agricultural

commodities. Agricultural income can be increased by expanding the area cultivated, increasing the land-use index, increasing productivity and market prices and diversifying crops. Even if the area cultivated remains unchanged, farmers can still increase their income by changing cropping patterns from low- to higher-value crops, so crop diversification plays a vital role in the restructuring of Vietnamese agriculture.

3. Development of diverse agriculture

Biodiversity plays a very important role in the prosperity of the country and its people, as well as maintaining natural cycles and an ecological balance. The government has promulgated a biodiversity conservation strategy for the period of 2013-2020 and vision to 2030, such as net houses, cold storage, botanic gardens are being developed, and in situ conservation practices are currently being applied. At present, approximately 18,300 germplasm accessions of 150 plant species (50% rice) are maintained in seed, in the field and in in vitro collections. According to the national genebank, there are 17,000 accessions that are categorized by 30-60 characteristics and more than 7,000 accessions that have been evaluated with respect to resistance to at least one pest or disease. The amount of plant germplasm being conserved includes 2,404 varieties of rice and 616 varieties of maize (in cold storage), 1,141 fruit varieties, 306 of coffee, 546 varieties of sugarcane, 230 types of flower, 179 tea varieties and 1,545 others (Ronnie Vernoooy, 2015)

4. Characteristics of cropping systems

The proportion of different farming systems within a region determines the land use pattern and the landscape characteristics. Cropping systems are also very diverse, both within and between regions. There are 15 strategic food crops in Vietnam. There are seven agroecological zones in Viet Nam: Northeast, Red River Delta, North Central coast, South Central Coast, Highlands, Southeast, Mekong Delta (Ronnie Vernoooy, 2015).

Cropping systems are mono-cropping, intercropping and rotation. The system from monocropping to multi-cropping. Multi-cropping is the practice of growing two or more crops in the same space during a single growing season. It has South Central Coast, Highlands: Agricultural land occupies 24% of the central highlands and 40% of the southeast region Perennial crops, fruit trees and forest trees are typical in these regions and make up about 79% of the total cultivated area (World Bank 2010). Cash crops, such as coffee, rubber, cashew and pepper have expanded rapidly over the last decades and have reached the highest levels in recent years. These crops can be intercropped with each other or with different fruit or forest species or annual crops.

River and Mekong Delta: These are the two major rice-producing regions of the country. The Mekong Delta alone has 2.56 million ha of agricultural land: 50% of the country's total rice area, 71% of the area devoted to aquaculture (54% of the national aquaculture output) and 30% of the total area for agricultural production. Rice yields in the Mekong Delta are higher than in the Red River Delta, where rice production is shifting to higher-quality production. The farm size in this area is also much smaller than that in the Mekong Delta, so farmers focus more on crop diversification and intensification, compared to the Mekong region where cropping systems in association with paddy rice are very limited because farmers prefer to focus on rice production. However, rice-shrimp, rice-fish and rice-shrimp-mangrove forest are practiced there. The Mekong River Delta is also a major fruit-producing region, with an area of 320,000 ha devoted to fruit, occupying 8.2% of the total natural area of the region.

The Ministry of Agriculture and Rural Development (MARD) has identified five strategic fruit crops for export: dragon fruit, mangrove, rambutan, durian and longan. Many fruit crops and vegetables are intercropped in home gardens in this region.

5. Environmental Friendly agriculture and food security

Vietnamese rice production has experienced constant growth resulting from application of good cultivation techniques (e.g., IPM and SRI, etc.), increased productivity the use of high yielding varieties and partly due to expanding the area cultivated annually. Since 1990, IPM has been introduced to Vietnam as a solution to change pesticide abuse habits of local farmers and better protect environmental and farmer's health. National IPM program managed by Plant Protection Department (PPD) of Ministry of Agriculture and Rural development (MARD) funded by various international agencies (FAO: Rice, Vegetables), (FAO-EU: Cotton), DANIDA (tea..). IPM program covered 63 provinces and FAO-led program has taken a participatory training approach called farmer field schools (FFS) Farmers Group, IPM clubs to empower rice farmers in making decisions (Escalada *et al.*, 2009; Huynh *et al.*, 2010. IPM practices for fertilization irrigation and pest management are followed. Inrainfed production systems, the application of intermittent irrigation will be a challenge. IPM rice-fish models, IPM clubs, IPM communities, golden snail management, rat management, rice disease management and seed rehabilitation have been promoted. Over the past two decades, it is estimated approximately eighteen percent of farmers from the Mekong Delta have been FFS-trained (Escalada *et al.*, 2009). Results were 10% of total farmers trained in IPM, 3,000 IPM clubs formed and operated 70% IPM participants are women, Training of Trainer's

course on IPM (TOT): 2,691 technician- trainers, 5,855 Farmer- trainers

The practices of rice cultivation on the plain, hilly and mountainous areas in northern Viet Nam are characterized by over application of nitrogenous chemical fertilizers and high transplanting density in rice production also contaminates the environment. System of Rice Intensification (SRI) was first introduced in Vietnam in the provinces of Hoa Binh, Ha Noi and Quang Nam in 2003 and 2004 by the National IPM Programme and PPD.

SRI promotion seems to be more effective when it is paralleled with trainings on organic farming inputs, like compost and organic pesticides. SRI contributes to the diversity of soil biota and agrobiodiversity. Soil biota are living micro-organisms in the soil and can be considered a measurement of the quality of biological soil fertility. Its diversity increases with the addition of organic matter, as well as the reduction of poisonous agro-chemicals. Improved biodiversity could also be observed in the paddy field, in particular through beneficial insects that are otherwise adversely affected by conventional fertilizers and pesticides. Meanwhile, IRRI-initiated IPM has focused on “no early spray” campaigns and made use of cost-effective well-developed multi-media (Heong *et al.*, 1998). The campaigns motivating that insecticide application in the first 30 days after transplanting or 40 days after sowing is unnecessary were instigated in two remote districts in 1994 and three years later, eighteen provinces in the South of Vietnam have applied this model from local funding, leading to the adoption by 550,000 farmers over millions of hectares of rice, while the media campaign was estimated to reach ninety percent of farmer households in the Mekong Delta (Nguyen *et al.*, 2001).

The model of rice cultivation following the method of “3 reductions 3 increases” was created in 2005 by Vietnamese scientists (3R3G) as a locally modified and improved IPM was developed and applied in the Mekong Delta to further encourage local farmers to reduce pesticide by submitting reduced seed and fertiliser application so as to gain higher yields, better rice quality and increased profits (Heong *et al.*, 2010; Tran *et al.*, 2006; Vo *et al.*, 2007). Due to its big benefits, the model of “3 reductions 3 increases” rice cultivation has been applied in the whole country. Many provinces have successfully applied this model such as Long An, Quang Binh, Can Tho, Vinh Phuc etc... Vinh Phuc has reduced sowing of seeds from 94.5kg / ha down to 67.5kg / ha (down 28%); Quang Binh average fell from 20 similar to 80kg / ha compared to the old farming practices. Binh Dinh Province has decreased nitrogen compared with tissue 10-15kg N old cultivation; Chau Thanh district (Can Tho City) fell to 23-46% of the N fertilizer, also 70-100kg. Vinh Phuc fell from 148.87 to KGN 183,8kg N / ha down 20%.

When 3R3G born model, pesticide fell so than earlier, down about 50%, which decreased to 100% with the amount of drug use with great efficiency brought, model farmers 3R3G be selected choose to apply for intensive farming towards sustainable production.

The Vietnamese Ministry of Agriculture and Rural Development (MARD) together with IRRI proclaimed the Mekong Delta One must do, five reductions” campaign in the Mekong Delta’s An Giang province in 2009 have proved considerable advantages of the model which is currently promoted to spread out all over the Mekong Delta. The one “must do” refers to using certified rice seeds; the five reductions concern efforts to reduce the amount of seeds, pesticides, fertilizers, water, and post-harvest losses (IRRI, 2012). The latest IPM-oriented program is ecological engineering launched early 2011 aiming to both restore biodiversity and ecosystem services and reduce the use of insecticide that destroys biodiversity (Escalada *et al.*, 2011). An Giang is pioneering implementation to design a ecological engineering ten-year (2011-2020) program called rice fields with flower bunds (ruong lua bo hoa).

6. Informations on organic agriculture in Viet Nam

Organic farming systems rely on crop rotations, crop residues, animal manure, legumes, green manure, off-farm organic wastes, and measures of biological pest control to maintain soil productivity and tilth, to supply plant nutrients and to control insects, weeds and other pests (Lampkin *et al.* 1999). Therefore, organic farming is best defined by its principal ideological background based on the concept of the farm as an organism in which all components - soil, plant and animals - interact to maintain a stable whole. This method of production is based on varied crop farming practices, it is concerned with protecting the environment and seeks to promote sustainable agricultural development.

There are three main types of organic farmers in Vietnam: the traditional organic farmers, the reformed organic farmers and the certified organic farmers. Although it is difficult to get a good estimate of the number of organic farmers in Vietnam, it is safe to say that each of these groups contains a numerically small number of farmers when compared to the vast majority of conventional farmers in Vietnam (Ngo Doan Dam, 2011)

Traditional organic farmers are those who have never embraced the use of agrochemicals in their production systems and continue to farm using traditional methods, including composting and crop rotations to maintain soil fertility and guard against pests and diseases. In practice these farmers are probably few in number today and are most likely to be found in the mountainous areas of central and northern Vietnam among the ethnic minorities. These farmers most likely use little or no agrochemical inputs because of limited access to them, either through distance from markets or the relatively high cost to purchase, rather than an organic philosophy that shuns the use of agrochemicals for health or environmental reasons.

Reformed organic farmers are those that at some point embraced the use of agrochemicals on their farms but have now shifted away from their use after learning about the negative economic, health and environmental impacts associated with the excessive use of agrochemicals through a training course or some other avenue. Along with the government supported training courses on integrated pest management .

Certified organic farmers are those that are certified as organic producers, or they are in the process of becoming certified. In 2008, Participatory Guarantee Systems (PGS) had been established as an organic quality system of PGS Vietnam was certificated by IFOAM to be trusted system for organic products. September 2013 PGS had gained success in certificating organic products in many markets such as USA, France, New Zealand, Latin America, Philippines, India and so on (Vietnam organic.vn, 2014) . Besides PGS, Vietnam also uses VietGap and GlobalGap standard for certificate organic products. VietGap is agricultural criterion that was initiated by Vietnamese Ministry of Agriculture and Rural Development. GlobalGap is used in Vietnam for certificated agricultural products in general and organic products in detail however, GlobalGap is usually standardized by other international organizations such as EuroCert, and Bureau Veritas with expensive cost. Certification standards are Globa GAP good step forward for organic agricultural production. Organic agricultural development in Vietnam very promising but need stable markets and prices attractive enough producer (Vo Thi Guong, 2013)

Organic farming according to the international understanding is quite new to Vietnam. There is currently only a very sparse amount of information available on organic agriculture in Vietnam and the topic has received little attention in the academic literature. Vietnam started to participate with organic agriculture trend quite late comparing with other areas of the world. In 1995, some domestic and foreign farming groups had introduced organic farming to Vietnamese agricultural union. Since then, organic farming have been developing and expanding both from customer's and farmer's awareness. In 2011, Vietnamese organic agriculture (VOA) union was established with purpose of joining all people who consider about producing organic in Vietnam to research, and develop Vietnamese organic production. The necessary for producing organic products has been taken care not only for human health but also for sustainable development natural resources. Organic farmers realized additional had made the degradation and erosion of land, so that, they started to come back to traditional planting methods with organic fertilizers. However, these acts were still single action by own care and with purpose of protects own land and products. (Dao, 2014).

Organic farming's impact on wildlife conservation and landscape is reviewed for the following indicator subcategories: species, diversity (floral and faunal), habitat diversity and landscape. For example, Le Ngoc Anh (2010) counted species in orange orchards They found higher numbers in organic orchards than in conventional ones, especially for ant. Lower species diversity (less than 10 spp.) was observed in the fields of vegetables, paddy/crops and commercial citrus orchards, while higher species diversity (around 20 spp.) was recorded in the fields of sugarcane and organic citrus orchards. In this study, vegetables fields, paddy/crops fields and commercial citrus orchards received high intensity of management that could be the result of low species richness in compare with organic citrus orchards and sugarcane fields.

According to the 2010 IFOAM report, the certified organic area in Vietnam was some 21.000 hectares only 0.07 percent of the total agricultural area of Vietnam, equivalent to 0.2% of the total cropped area of which 7000 ha was for aquaculture (mainly shrimp). The total export value of the organic products was some 12-14 million US\$. Vietnam also has some 44 ha of natural forest for wild harvesting. The main organic products in Vietnam are spices such as cinnamon, star anise and pepper, fruit, cashews, tea and some vegetables. Organic aquaculture, particularly shrimp farming, is also an important part of the organic industry in Vietnam (Willer and Yussefi 2006). The local Vietnamese market for organic products has not been developed, although one company tried to introduce organic vegetables to consumers in Hanoi some years ago. The 2015 FIBL- IFOAM reported organic agriculture land 37490 ha (0,36% of all agriculture land) with 6829 of producer. However, Vietnam is assessed to be a good producer and market for organic products by the available natural resources and labor resources.

The main problems to bring Vietnam to be come an organic country can be because of the poor ability of evaluating system which is not accepted globally. For this reason, products after certificate loose price competitive advantage to compete to other producers. (Anh Thu, 2014) Although Vietnamese organic agriculture still stays in potential position for market and producer, Vietnam have started to export their organic products to other countries. In 2012, BIO Organic and USDA certificated Vien Phu- Vietnamese rice production with rice product to be 100% organic product which was fulfilled USA and European's organic quality system.

The Government also has no specific policies to support the development of organic agriculture in the country and as a result there is still little attention on organic farming from research and the extension service. However, the Ministry of Agriculture and Rural Development (MARD) issued national basic standards for organic production (National standard for organic production and processing 10 TCN 602- 2006) as issued by MARD on 30 Dec 2006, which can now be used as a reference for producers, processors and others interested in organic products for the local market. MARD is planning to set up a certification system for the local market but a timeframe for this activity has not yet been developed. Some private service providers, such as Qualiservice, recently developed competencies to support farmers in obtaining certification (organic and GAP-Good Agricultural Practice) for agricultural and fishery products. A recent good move was that in late 2011, Vietnam Organic Agriculture (VOA)

was officially established and in May 2012 the First Congress of Vietnam Organic Association was held. Though Vietnam had made great achievement in agricultural production, research and training activities to promote organic production have not been paid a considerable attention by the research and training communities. Information on organic research results activities mainly focus on breeding new crop varieties and developing appropriate production technologies for such crops; producing better quality and safe crop products based on the ICM, good agricultural practices (GAP) principles. Proceeding of the 1th National Workshop organic Agriculture- Situation and development orientation was held at Ho Chi Minh City in September 27th 2013 with results models about organic farming for producing vegetable, fruit, medicine plant, organic fertilizer... There have been some good models for organic production in Vietnam such as the ADDA-VNUF project on organic vegetable for domestic markets; Under the technical guidance of the project composting ADDA, farmers have collected dung of livestock, crop residues such as straw, corn stalks, peanut, beans etc ... and wild-growing plants to make compost. ECOMART for organic tea production to export to European countries and US; organic shrimp in combination with forestation in Ca Mau for exporting to Switzerland; ORGANIK Dalat for vegetable production to meet the demand of high demanding markets and customers. Initial efforts are also being pursued to produce organic rice in VIENPHU Green Farm for exporting to US market (Ngo Doan Dam *et al.* 2012)

7. Conclusions

It is important to raise awareness among the farmers through adequate education on sustainable maintenance, conservation and utilization of the resources. The organic food have become more widely available in mainstream consumers. Vietnamese farmer need more training workshops on organic farming techniques. The conservation of diversified and structurally complex shade canopies composed of native trees species is important for the conservation of a large number of native tree species and as a structurally diverse habitat for many other organisms. Basic principles pest management in organic farming is to have a healthy plant resistance to pests and diseases better, and must organize a structure good crop rotation to reduce the risk of disease transmission from tree this to other plants. The ecological engineering approach to pest management is still young but it provides a strategic methodical framework for researchers wishing to apply ecological knowledge and experimentation to pest suppression in the field. Ecological engineering has the potential to complement IPM programs currently being used in many agricultural systems, including tropical rice, by improving the efficacy of natural enemies and reducing reliance on pesticides. To promote a significant organic production in Vietnam, much greater efforts should be made from the Government in setting up long term programming for organic production areas in different agro-ecological regions and localities in order to support farmers and organic agriculture more sustainable development; Collaboration among farmers is increasingly recognised as beneficial for successful agri-environmental management.

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