MANAGING RICE AND SOYBEAN VARIETIES IN JAVA AND LAMPUNG: TWO CASES OF FARMERS' CREATIVITY

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The evolution of farming culture in Indonesia: an introduction

'… [T]hat was a period of stupidity,' stated farmers in Central Lampung in describing the condition of their mind during the previous crop farming intensification programme. That was the period when the Indonesian central government adopted the Green Revolution paradigm in crop farming programme. 'Now we have the period of enlightenment, of improving our knowledge,' referred the same farmers to recent time when they learned how to improve knowledge through the Integrated Pest Management (IPM) programme. For many farmers, IPM has improved their mind, enriched their knowledge, and empowered them so as to enable them to take decisions that – according to their viewpoint – are suit better to their existing resources and condtions (see Winarto, Maidi, and Darmowiyoto 1999; Winarto *et al.* 2000). Self-reliant on their own discoveries through a more systematic way of learning, is the most distinguished phenomenon discovered among those who experienced the ways the IPM had led them to know about things they did not know, or were allowed to do. The latter also relates to the greater courage they now have in voicing their interests, desires, problems, or arguments against any ill-wise policies and recommendations. Such an improvement leads to farmers' creativity more than in the past three decades where farmers were forced to adopt and implement the government's packages and technological recommendations.

Farmers have been and are always creative in their efforts of solving the daily problems of crop farming. What makes the differences in their current creative practices from the period prior to the introduction of IPM? My observation on the north coast of West Java and Central Lampung reveals the enrichment of farmers' knowledge and information that contribute to the wider options and references in their decision making process. They learn not only of 'what' question they should answer or refer to, but also the 'how' question in carrying out observation and practices. A wider option of pest control strategies, not merely dependent on chemical control, is a reality resulting from the improvement of farmers' creativity (see Winarto 1996; Winarto *et al.* 2000). If a diverse strategy in pest control is an evidence of the improvement of farmers' knowledge and practices, how about their choice in crop varieties?

The 'Green Revolution' in Indonesia and various developing countries was known for its contribution to the decline of the heterogeneity of rice variety (see Fox 1991; Shiva 1991, 1993). An old farmer remembered the days where he planted various rice varieties in his field in one planting season, and so also do his fellows. He seldom experienced one rice variety planted dominantly by a majority of farmers in one planting season as what is found nowadays (also see Winarto 1997). Not only in rice, the government's crash program in other crops, such as soybean, which then failed, led to farmers' abandonment of cultivating

soybean for almost a decade as found in Central Lampung. The farmers named the period of abandonment as the 'sleeping years' of soybean cultivation (see Winarto *et al.* 2000). During my observation in the years after the introduction of IPM programme, I found a more dynamic cycle of farmers' choices of rice varieties on the north coast of West Java, and a return of diverse soybean varieties in Central Lampung. To what extent does it relate to the improvement of farmers' creativity? What factors contribute to the appearance of such phenomenon?

Creativity relates to the individuals' ability to find new strategies and produce new ideas as a result of combining a set of information existing in their cognitive minds (see Strauss and Quinn for their theory on connectionism, Strauss and Quinn 1997; also see Choesin 2001). The extent to which individuals are able to produce new ideas would depend on how they are able to combine which ideas – either the old, or the new ones, or the combination of both - in responding to particular situations. However, this ability and the available information they can obtain would also depend on the external factors. To what extent the existing circumstances enable them to freely take their own decisions, and hence, creatively produce new strategies and practices? The Green Revolution paradigm are still underlining various government programmes in increasing productivity. Yet, the 'recreation of farmers' own niche', in which farmers have the freedom to exercise their own strategies, is underway in many places (see Winarto forthcoming). Producing crops 'free from pesticides' (*bebas racun*) is the aim of some farmers in both Java and Lampung. This is one example of the farmers' desires of producing healthy crops on top of the high yielding ones as intended by the national government. In combination with farmers' self reliant on their own knowledge, discoveries, and strategies, and the change in some bureaucrats' perspectives and attitudes supporting the IPM paradigm, the circumstances the farmers have these days are favourable for their creativity to flourish.

This article examines two cases of farmers' creativity: the north coast of West Java farmers in selecting rice varieties, and the Central Lampung farmers in reproducing soybean varieties. The two cases reveal some similarities and differences in how farmers pursue their practices in finding the most favourable varieties, under what conditions do those practices persist, and what the implications are to their cultivation strategies.

Managing diversity in rice varieties: the cycle of individual choice and consensus

Whereas diversity in ecological point of view leads to a greater stability and sustainability in an ecosystem, variability in anthropological point of view enables a culture to evolve (see Johnson 1972). A diverse range of rice variety planted by farmers not only provides a greater chance to spread the risks of harvest failures, but also allows them to learn about the variability of each strand's characteristics and performances. Farmers' knowledge improves through comparative observation of diverse plants' performances in one planting season, as well as from planting different varieties in different seasons. This was the most distinctive learning process in the period prior to Green Revolution that was then being degenerated due to the decline of varieties during the period of rice intensification. Rice varieties have been a very important subject of the scientists' technological experiment in agriculture, in particular when the crops' susceptibility to pest and disease increased (see Fox 1991). VUTW (*Varietas Unggul Tahan Wereng,* the high yielding variety against *Nilapavarta l.* or brown

planthopper) is an acronym known by farmers as the varieties produced by the government's seedling company that have genetic resistance towards brown planthopper. This pest has become the most significant pest in rice farming after the release of high yielding varieties (Bahagiawati and Oka 1987; Fox 1991). How to improve rice varieties' resistance towards this pest has been the highest priority in agricultural technology up to recent times. As a result, the government would enforce farmers to adopt the most resistant variety to avoid harvest failure while also keeping the high rice productivity. 'The government told us of what to plant, when, and how,' complaint an old farmer towards the government's regulation imposed to farmers to plant the 'government variety'.

In spite of the complaints, gradually, farmers undertook both the high productivity and sustainability performances into their selection process of rice varieties. The sustainability of a variety is related not only to the variety's susceptibility towards pest and/or disease, but also to the variety's performance in a particular season, i.e. the dry or the rainy season that has different climatic conditions. In turn, the latter could also be conducive for the infestation of certain pests/diseases. On the basis of their accumulative knowledge season by season, their familiarity towards which pests/diseases are used to infest their crops grow. However, despite this complex set of variables to consider to, they still strongly hold their choices on rice palatability and good quality of grains, as well as the high market demand and the best selling price they would be able to gain. The latter does of course depend on the previous seasons' experiences, which sometimes fail. Another factor that is often expressed by farmers is their motivation to keep trying new varieties, or those found promising in relation to the aforementioned performances. They have a great desire to always try a new, or another variety. The extent to which a farmer does exercise his/her own choice, however, depends on how brave he/she is to plant a variety, which is not always in conformity with his/her rice field's neighbours' choices. Again, the latter is related to the vulnerability of pest/disease infestation if a farmer plants a different maturity period of a particular variety as compared to the rest of his/her neighbours'.

Looking at how farmers take into account such a complex set of variables in making up their selection, it is apparent that farmers are always engaged in the process of learning in order to answer their own question of what to plant in the following season. Each farmer does a reflection of what has been experiencing in the past season, and of what to learn from those experiences to have a better yield, or to maintain the good harvest they were able to obtain. The past experiences were kept in their memories, and the more recent ones as a result of their current practices are added into their knowledge repertoire. Which inputs are combined into the old ones, and yields a new combination of information that further becomes the basis of their decisions, could vary individually and/or seasonally, according to the situation the individuals have to face (see Strauss and Quinn 1997 on their arguments for 'connectionism' in understanding how knowledge works and improves on the basis of the connection between the extra- and the intra-personal factors). If such a process has been part of farmers' ways of learning, what is the difference of the recent from the past experiences prior to the introduction of IPM programme?

When I visited the hamlet recently where I did my research in early 1990s, and then through short visits in 1996-1998, several farmers told me that the extension worker for their hamlet's farmers' group decided not to organize an extension meeting regularly, e.g. before the planting begins to facilitate farmers in selecting a particular variety, unless farmers themselves invite him to come. The extension worker considered farmers in the hamlet of

Marga Tani, Ciasem Baru as 'clever enough' to decide on their own, in particular after their learning in Integrated Pest Management 'school'. Hence, farmers experience a lesser degree of an enforced recommendation. On the other hand, they told me of a special seminar run by the agricultural research station nearby where the agricultural experts informed farmers of a range of new varieties recently released. Despite this new source of information, farmers, as usual, obtain information of the existing new seeds and their performances from various sources: fellow farmers live within and in neighbouring hamlets, workers in the government' research station or seedlings company, traders, relatives from nearby or distant places, etc. (see Winarto 1996). I feel a greater autonomy farmers now have to make up their own decisions. An evident for this autonomy was the planting of a local variety that was not released by the government's seedling company since 1996, replacing the previously prominent high yielding variety (IR64, see Winarto 1997, 1999). A reflection and learning process continued when the farmers realized of the susceptibility of this local variety towards brown planthopper in rainy season. In line with the emerging new varieties planted by several individual farmers, on the basis of observation and comparison, farmers again made up individual selection of planting a more promising variety.

In 1999/2000, farmers experienced a decline in the sustainability of the local variety known as *Muncul*, and only a very few farmers left to plant the previously prominent high yielding variety, IR64, which had been planted continuously from 1987. At that time, a farmer-trader bought grains at the agricultural research station nearby. He observed a good quality of grains from a variety that was then known by farmers as '*Galur*'. '*Galur*' refers to the plot where the agricultural scientists used to plant the experiential seedlings. He took some amount of grains and decided to plant the seeds in his field. Later on the same seeds were officially released as *Ciherang.* His neighbour, an IPM farmer, observed the good performance of this new variety and decided to buy some grains from the farmer-trader. The seedlings grew well and the yields were high. Another IPM farmer bought the same seeds through his permanent worker who did the *bawon,* harvesting job at a farmer's field in the neighbouring hamlet. The farmer also proved that the seedling's performance and the yields were good. Through farmer-to-farmer knowledge transmission (observation, comparison, conversation, and seeds-exchange), the new variety was widely planted by farmers during the rainy season of 2000/01. Unfortunately, in that season, many farmers experienced harvest failure due to the heavy rain and storms at the time the plants were flowering. However, with the existence of other varieties, and the planting of the same variety at the time earlier than the failed ones, they learned that different characteristic of plants' growth of different varieties, as well as the planting schedule were the causal explanations of why the degree of harvest failures varied. In the following season, dry season of 2001, many farmers decided to replant *Ciherang*, but a few farmers again planted a different novel variety (e.g. *Widas*), and still some farmers planted the old ones. From the same mechanisms of obtaining seeds, these few farmers decided to try the new one. Again, through comparison and observation, the farmers learned of the different performances of varieties during the growing period, pest infestation (white rice stemborer) at the reproductive stage, and from the yields, grain quality, and price. At the time they have to select a variety to be planted in the next rainy season of 2001/02, each farmer is now considering the various types of performances of varieties planted everywhere. Some farmers already decided to try again new varieties, released by the agricultural research station (*Cimelati*), or planted by farmers in other hamlets (*Lanay,* and a *Taiwan* variety).

This story reveals how creative farmers are in selecting rice varieties, and how continuous their learning process is. Since each farmer feels free to decide on his/her own choice, a diversity of rice variety in each planting season is common. If they agree on the good performances of a particular variety, a more dominant variety planted in one particular season by a larger number of farmers will be the result. However, once the variety does not perform well as a result of various factors, the common choice could be shifted to another more promising variety, again, preceded by a more diverse outcome of varieties planted through individuals' selection. Hence, I notice a cycle of learning process with its different results: diverse varieties grown in one season, followed by a more uniform choice, followed again by the planting of a more diverse types of varieties, and so on. I argue that such a cycle is a very significant mechanism in sustaining the yields the farmers can obtain in a complex and constraining environment, such as climatic hazards, pest/disease infestation, a fluctuation in market demand and price, etc. As long as they can have an access to gain information of new varieties planted elsewhere, or released by official resources, they will always try to plant them to be able to improve their harvest yields. Selecting, trying, observing, learning, selecting, and trying again, is a way from which farmers enrich their knowledge and experiences. The same cycle of learning process is also found among those who planted secondary crops intermittently with rice. How do the latter manage the diversity of soybean varieties, which was once 'gone' from their world of cultivating secondary crops?

Managing diversity in soybean varieties: the 'return' of the 'lost' varieties

'…[S]leeping for seven years,' this is the metaphor the farmers in Central Lampung use when describing their inaction in cultivating soybean from the time the harvests of soybean continuously failed. The 'crash-program of soybean' (*Operasi khusus kedelai, OPSUS)* launched by the central government was, in farmers' eyes, the source of the failures. The program ignored the prerequisite of planting soybean according to farmers' cosmology: i.e. the need to grow plants according to the Javanese traditional calendar known as *pranata mangsa,* which refer to the move of sun from the north to the south in six months period annually (also see Indrowuryanto 1999). According to this belief, farmers can only begin planting at the appropriate month, so as to ensure the growth of a healthy crop. Once this planting cycle was broken down due to the enforced intensification programme, their crops suffered a continuous pest/disease attacks until at last, they decided to stop cultivating soybean. They felt helpless since whatever 'medicines' they used to control the soybean seed borer, they could only harvest 'empty soybeans', or 'soybeans without seeds' (*kedelai tanpa biji, kopong*). Crops vulnerability became a common phenomenon everywhere, not only for rice, the main crop, but also for secondary crops such as soybean. Again, this phenomenon proves that external factors originated from the implementation of central government's program changed farmers' habitat drastically. Not only that, the changes caused further significant consequences, i.e. the growth of farmers' ignorance of planting soybean in a sustainable manner in the changing habitat, and in the increase of uncertainty (see Hobart 1993). Farmers' confidence was gone. To return their 'lost of confidence' was not an easy effort to do. If they are now able to replant some soybean varieties, the question is: how could that be possible?

The case of farmers' experience in Central Lampung (Terbanggi Besar) is unique in which a non-government agency (Yayasan Gema Desa) initiated to assist farmers in solving this

problem. This effort was continued under the collaboration between farmers, who organized themselves in a collective farmers' group known as Tim PHT (Pengendalian Hama Terpadu, IPM) Lampung and recently adopted a local name *Wakak Juko* ('grass root'), and an international NGO (World Education). This agency has been the farmers' counterpart in institutionalising the Integrated Pest Management approach since 1994. Understanding the degree of difficulties by considering their inability of finding the most effective pest control strategies, they invited national and international entomologists. From the international entomologist, farmers learned how to carry out 'studies' (experimentations). Three main 'studies' which then effectively helped them in controlling soybean pests were: 1) the most efficient and effective light-traps; 2) the kerosene light-trap and its most effective time; and 3) the nest-trap and its most effective time. In line with various other studies, gradually, farmers were able to develop a set of control strategies for two pests: *Etiella hopsoni* and *Zenckinela.* The shortened name of the seed borer, *Etiella*, was later become part of the farmers' vocabulary. At the same time as carrying out those studies, farmers replanted soybean varieties by finding seeds from various sources. They also developed an understanding of which varieties were suitable for a particular elevation and Ph condition of soil, besides reactivating their knowledge of the Javanese calendar system for cultivation (*pranata mangsa*). Referring to this calendar is still a prerequisite, even though they now have to complement it with a more careful observation and pest control management. The traditional calendar could not be the sole strategy any longer in such a vulnerable environment (see Maidi *et.al* 2001). A story told by a farmer who diligently carried out his individual studies and observation reveals how extensive his knowledge is after learning from his own observation. He told my research assistant that:

> All kind of varieties can grow well in the lowland up to 600 m height above the sea level, but there are some varieties that are better suited to lowland, e.g. *Wilis, Sinyonya, Dempo* and *Kerinci*. Two varieties are well suited to higher land, e.g. *Wilis* and *Tambora*. If the soil is acid (Ph. 4-5,5) plant *Wilis* or *Rinjani*. If the soil has a high Ph, plant *Lompo Batang* or *Amerikana*...The most important things to remember are: 1) the height; 2) soil acidity; 3) Ph. degree of soil; and 4) the appropriate season, where there are heavy rainfall during flowering phase up to the filling up phase of the seeds. In a 20 day period, the rain can halt the growth of the seeds-larvae, *Etiella* (Winarto *et.al* 2000).

He also explained the details of *Etiella*'s life cycle and the period where this pest infested the seeds of soybean. By planting the varieties in month 3, 7, and 11, the heavy rainfall will occur at the time the crops reach the age of 40-60 days of planting, during the flowering and filling up stage. Under a heavy rainfall, the young fragile larvae of *Etiella* could be swept off and die. In one story, he was also able to mention 8 different varieties of soybean, which means that these varieties have not been at all extinct from his environment. As soon as he and his fellows replant the soybean varieties, an option of selecting a range of varieties again becomes available. Not only that, the farmers also carried out experiments of producing a high productivity soybean, which is also 'free from pesticides'. An example of this is a variety known as *Amerikana* of 3 m tall. A farmer–who did the experiment of improving the quality of a variety released by the agricultural research station–in collaboration with an agricultural official, named the variety as *Amerikana,* referring to its height that is as tall as an American. When I entered the farmer's office, I saw a very tall soybean plant, which almost reaches the ceiling.

Even though farmers' knowledge and practices improved through learning from experiences of replanting soybean in a different environmental condition, the efforts of returning farmer's confidence, knowledge, and practices have still to be sought. The farmer-organizers and farmer-trainers in IPM designed a special curriculum for a Farmer Field School (FFS) for Soybean and its follow up. They integrated this curriculum in the whole program of disseminating IPM strategies, i.e. by categorizing the 'school' as a more advanced IPM training. The complex set of variables that have to be taken into account in developing a sustainable cultivation strategy is the reason of why farmers themselves considered the training for soybean as having a higher level than the IPM 'school' for rice. Before conducting a FFS for soybean, the farmer-trainers decided which variety would be planted in the experimental plot. The decision could vary in different 'schools' conducted every season in different locales. By doing this, the farmer-trainers themselves have the opportunity to make comparison and observation of which varieties could grow well under what kind of conditions and treatments. Also through such a way the diverse varieties were returned to the farmers' habitat with a more promising performance. Most importantly, they were able to replant the varieties 'free from pesticides', or 'free from poison'. This motto has become the main objective of the farmer-organizers and trainers in disseminating the IPM strategy. The word 'poison' instead of 'medicines' has also been gradually part of farmers' vocabularies.

By learning from direct experience through training, in particular if the harvests are good, the IPM farmer-trainees gradually regain their confidence and knowledge of cultivating soybean. The success stories of their efforts in replanting soybean varieties with promising yields were spread to distant places, including among farmers in the other district where I also did my research. Asking my help of bringing the good quality of soybean seeds from Terbanggi Besar, and conducting a FFS for soybean are examples of the farmers' great desires to be able to replant soybean in a sustainable manner. When the harvest of the soybean experimental plot of the 'school' was good, not only the IPM farmer-trainees were happy and hence, regained their confidence, but the other farmers also praised the harvest and expressed their willingness to again, replant the soybean (see Winarto *et.al* 2000).

This story reveals how creative farmers are, once the external factors are supportive for them to pursue their own ways of learning (through trial-and-error experiments, observation, and comparison). However, the traumatic experience of the continuous harvest failures of cultivating soybean, and their ignorance of controlling the emerging pests are not easy to be healed and improved without external help. In this case, the assistance of non-government agencies and their support of inviting experts, as well as conducting the IPM training, and empowering farmers to carry out studies and pursue the IPM training on their own, are very significant. The 'adult learning process' and 'learning through discovery and experiences' as practices in the FFS have improved farmers' confidence of solving their own problems. Once, they gain the confidence, another significant snowball emerges. The empowerment process yields prominent result, i.e. of how they themselves planned and managed to disseminate the findings, strategies, crop varieties, and knowledge to a large number of farmers. Throughout this process, a reinvention of tradition as revealed in the aforementioned story is evident. Moreover, the reinventing tradition occurs in a more enriched way of cultivation within an increased uncertainty in a complex environment. By reinventing and enriching their traditional knowledge and practices, farmers are able to preserve the biodiversity of soybean varieties in a more healthy way of cultivation. This is the promising feature of producing a more sustainable agricultural system in the future.

Towards a more sustainable agriculture: a 'dream' or a 'reality'?

The two stories reveal how farmers are struggling in the current environment of crop farming with unexpected hazards, and the infestation of various kinds of pest and disease affecting the yields of their crops quite significantly. A more sustainable way of cultivating crops has been the farmers' dreams from the time they experienced continuous or repeated harvest failures. Success stories of their harvests were frequently followed with unhappy and depressing ones. In the early 1990s, farmers on the north coast of West Java experienced severe white rice stemborer attacks (see Winarto 1996). Brown planthopper again infested farmers' fields in 1998s. When I returned recently, farmers told me stories of their two consecutive harvest problems: the heavy storms and harvest failure in the rainy season of 2000/01, and the return of white rice stemborer in the late dry season of 2001 after almost a decade the pest's population did not severely damage their crops. In 1998-99, farmers in Lampung experienced severe harvest failures due to the unexpected attack of a huge population of grasshoppers. The brown planthopper was also attacking their fields at the time this pest damaging fields on the north coast of West Java. These are only part of the stories of how farmers have to cope with unexpected hazards. What does the return of white rice stemborer mean in relation to the sustainability of their eocsystem? Is it not an indication that their dreams to always have success and happy stories of harvesting crops were far from reality? I argue that farmers are still striving to have a sustainable habitat, as well as a more prosperous life without any more debts they have to bear upon by experiencing harvest failures.

Throughout their struggles, however, farmers themselves would creatively find ways of solving their immediate problems, which in turn provide an opportunity to enrich their knowledge. One alternative way of doing this as found among rice farmers on the north coast of West Java is through selecting a more promising variety on the basis of individual's choice by considering a set of various variables. Since individual farmer can pursue his/her own decision, a diversity of rice varieties could be preserved. The greater freedom farmers have in pursuing their decisions in a more 'unforced way of government's recommendation' provide a more favourable climate for the conservation of diverse varieties, the shift towards other varieties, and the enrichment of farmers' knowledge.

Nevertheless, it has not always been the case that they themselves would be able to solve problems effectively as the case of farmers in Central Lampung. The loss of confidence and feeling of helplessness underlie their decision to abandon soybean cultivation. Despite the abandonment of their practice, farmers' knowledge of cultivating soybean according to the Javanese calendar system still constitutes part of their knowledge repertoire. Farmers realized later that practicing this knowledge solely would not yield good results in the changing environment. Since they had never had an experience of severe pest attacks and had never learned about the ways of carrying out a detailed and systematic observation as the scientists did, they were ignorant of what to do to control pest infestations. Once they learned the possible ways of controlling pests through a more systematic study and observation, then the door for searching ways of controlling pests as well as improving their cultivation strategies was opened. A reinvention of their traditional knowledge and practices in an improved way of cultivation by incorporating effective pest control strategies was the reality. Farmers' knowledge is improving, and so also the sustainability of cultivating soybean. Into this

situation that the outside helps through experts' assistance, IPM training, and NGO's facilitation in empowering farmers were significant in improving farmers' own ways of learning and solving problems.

It is apparent that farmers themselves have the talents and potentials to creatively improve their knowledge and practices, and cultivate their crops in a sustainable way. However, once the external actors intervened with their world of farming through changing farmers' own ways of cultivating crops, the unintended consequences occurred that in some cases, resulted in the abandonment of their practices, the loss of confidence, the growth of ignorance, and more severely, the creation of unsustainable and degrading environment, and the loss of rich genetic resources. The cases examined in this article prove that in such a situation, regaining farmers' own confidence and knowledge in an improved way could be evident once they receive appropriate assistance, and a greater freedom to exercise their own decisions. As Strauss and Quinn (1997) argue, the external factors are significantly affecting the internal process of individual cognitive minds. It is thus high time to reconsider the paradigm of developing agriculture if we would like to see that a healthy and sustainable agricultural ecosystem and a more prosperous life for so many innocent farmers are a reality, and not only a dream.

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