

Chapter V

Discussion

The field survey was conducted in April 2002 during off-season of rice production. The system of rice production in the villages covered by the survey was found to be a subsistence system of production in which rice was produced to meet household needs rather than for sale. The average area of production per household was generally only sufficient to meet immediate requirements. There was little or no rice available for sale. Despite the lack of significance of rice for commercial production (i.e. sale), rice production is the single most important activity of households in the study area.

The survey established a high level of varietal diversity at both village and household levels. A total of 19 different rice varieties were found in the three villages covered by the survey. Most households grow two or three varieties every season. Although seed rice is kept from season-to-season, most farmers only undertake seed selection every year from their fields, some farmers select every two or three years.

Conditions relate to the reasons for the lack of adoption of improved varieties include the lack of suitability of these varieties to the growing conditions in the province, as well as cultural, environmental, infrastructure and service (particularly extension services) considerations. There is also a traditional preference for growing and consuming glutinous rice.

There is a large level of varietal seed exchange between and within villages by relatives and friends. However, for seed obtained outside the village, the varieties are tested before being adopted. High and stable yield are the characteristics most sought in the introduction and adoption of new varieties. However, other characteristics, which are also considered include - maturity period, grain quality (eating quality), and

its adaptability to moderate or low soil fertility conditions. Other factors that can also influence the selection or adoption of new varieties include - size of land holding, family labor and level of food-sufficiency.

Within the total of 17,279 accessions of rice germplasm evaluated by Dilday et al (1998) they found grain length ranged from 3.0 to 9.9 mm, with the length and width ratio ranging from 1.0 to 8.0. In the study are, total 19 varieties were measured, grain length and width was ranged from 6.41mm to 9.92 mm and 2.83 to 4.06 mm of length and width, respectively. Ratio of grain length and width was ranged from 1.81 to 3.37. Root square of generalized variance (\sqrt{G}) in grain width and length of *Kaopu* (KP) was 0.309, exceeded 0.260 for those landraces from India and Thailand and those for hybrid swarms between wild and cultivated plants (Sato,1971). This variety was highest variance based on value of \sqrt{G} and it seems to be mixture population with different grain shapes within seed lot.

Yoshida, (1981) indicates that 1000-grain weight is a stable varietal character due to grain size being rigidly controlled by the size of the hull. Grain would therefore not grow to a size greater than that permitted by the hull, no matter how favorable are weather conditions and nutrient supply. The size of hull, however, is subject to slight modifications caused solar radiation during the 2 weeks before anthesis. Dilday et al (1998), report that for 17,279 accessions held by the Dale Bumpers National Rice Research Center (DSNRRC), 1,000-grain weight ranged from 6.9 g to 40 g. Total 19 varieties found in the study area, 1,000-grain weight ranges from 24 g to 41 g is over Dilday reporting. Shape variation of rice grain based on length/width ratio can be classified into three types: slender, large, and round grain types (Oka, 1988). In my study was found that rice varieties in lowland field belong to round grain type, while upland varieties are mixed between slender and large grain types in the same seed lot.

I found that, there were three varieties under *Kainoy* names: *Kainoyleuang* (KNL), *Kainoydang* (KND), and *Kainoyhai* (KNH). A small round grain type and good eating quality are similar of these varieties. The different characters are: KNH is

upland rice and larger grain size than KNL and KND. Both KNL and KND are lowland varieties. According to farmers, KND was selected from KNL population. KND is smaller grain, earlier maturity, and brown to red grain color than KNL.

The experiment was conducted at Chiang Mai University (CMU) during the period June to November of 2002. Diversity between and within rice samples were measured by using Shannon diversity index based on both grain and plant morphologies. For grain morphological diversity, there was different between varieties and also within variety that selected from different farmers. Within the same seed lot was different degree of diversity. However, morphological characteristics might be not controlled by only one gene so that observation by using morphological characters does not identify the diversity at gene level. In addition, environment and genotype lead to difficult classification especially in color of leaf, grain. Diversity of grain within KNL1, 2, 3 was a higher than another ones. Within seed lot of KNL variety there were awning grains and no awning grains mixture in the same seed lot, awn color was also different, and some grains have hairs and other no hairs. In contrast, for basal leaf sheath color upland varieties were mixed between purple line and green colors in the same seed lot. Most farmers in this area, seed selection is practiced but they do not look carefully in detail of different within their seed lots, they just separate as they seen differently particular plant height and maturity. However, some farmers intend to mix different varieties in the same seed lot if they are similarly in maturity, eating quality, but different grain and panicle sizes.

Grain yield was varied from 1.3 t/ha to 1.6 t/ha for upland field experiment and 2 t/ha to 2.9 t/ha of the lowland field experiment. In upland field experiment, low tiller production was observed from each seed lot, while a higher sterile of grain was also observed from each seed lot in lowland field experiment.

Harvest Index (HI) is a measurement of the economically useful fraction of the biological yield. Total dry weight for a good rice crop is around 10- 20 t/ha (Yashida, 1981) depending on the variety, management, and environment. For traditional tall varieties the HI is usually about 0.3, while for improved short varieties the HI is

usually about 0.5. As a result, grain yield usually range between 3 to 10 t/ha per crop unless the crop lodges. Based of this information in my experiment, HI was lower than 0.40 in all of 9 seed lots with 6 traditional varieties, and similarly in KNL variety on farmers' field in Ban Kane. HI of all traditional varieties in my study ranged 0.3 to 0.4 similar in Yashida (1981)

Crop survey was done in time of farmers harvesting to estimate yield component, diversity of variety and farmers' practice in lowland rice production. Total 23 of farmers' field in Ban Kan were selected for studied, 3 samples per farmers' field with sample size 1m² of each sample. Number of hills/m² ranged from 18 to 28 on average depending on cultural practice of individual farmers. There was significant in average of yield was ranged 3.45 t/ha to 5.67 t/ha. This data over the provincial rice yield is 3.24 t/ha and 3.04 t/ha of the national yield (Lao- IRRI, 2001). However, most of the fields closed to canal often perform yield well than which is away from canal. Chemical and organic fertilizers were not used for all of farmers' fields, expect in seeding stage. During seeding stage in the seedbed, urea and manure fertilizers were applied. In period of the crop survey, I observed that weeds were not a problem because of a good water management. Rice fish culture has been common found in this village this associated with resulted of the good water control.

Total 23 own seed selection of farmers' fields were estimated. Diversity between farmers' field in term of degree of off-type plants mixture and number of awn panicles as well as leaf blade pubescence was variance. Off-type plants were observed from farmers' fields, with different in height, larger grain size, and early and late maturity. The off-type plants, some farmers did not know the name because its some morphologies differed from their varieties as they got. In general, off-type plants are low quality eating because it was hardy when cooked and high unfilled grain but normally, heading and early maturing was early. Farmers had paid attention to cut these plants during weeding, harvesting times. However, I found that only one few farmer in Ban Kan mixed different variety in the same seed lot because it matures the same time and similar eating quality but it differs in both grain and plant morphologies.