In this chapter, we focus on the question of rice yields. Rice is the single most important crop, economically and culturally, in the Philippines. Nationally, rice accounts for 41% of the total calorific intake and 31% of total protein intake of Filipinos (Juliano 1993). For poorer farming households, particularly on non-diversified farms, rice is often the only food eaten by a family in a day. Most households in the study depend heavily on rice economically as the dominant crop sold to market.

While the farmer-led sustainable agriculture approach encourages diversity, for MASIPAG and most Filipinos, this is done within the context of a rice-based system. Yields of rice are an important part of the total productivity of the farm. For this reason, we have focused principally on rice yields in this chapter.

The study found that rice yields for the full organic farmers using farmer-bred varieties of seeds are on par with the yields of the ‘high yielding varieties’ of seeds used by conventional farmers. This is an impressive result that lays the foundation for the strong income and food security results outlined in the previous chapters. Furthermore, the study shows that rice yields for organic farmers are actually increasing over time in contrast to declining yields experienced by the conventional farmers.
Over the past several decades, the vast majority of agricultural research and support has been focused on the development of genetically uniform seeds that demand high levels of inputs such as pesticides and chemical fertilisers. The approach started with the HYVs (high yielding varieties) of the ‘green revolution’ and continues with the current emphasis on hybrids and genetically engineered crops. Conventional farming requires farmers to purchase such ‘high yielding varieties’ of seeds and the associated inputs such as pesticide and chemical fertiliser to maximise yields. The crops harvested are then sold to cover costs. Unfortunately, this approach has met with many problems. Uneven application of inputs combined with the rigours of ‘real life’ application including pest outbreaks, disease and climatic fluctuations has meant that the seeds regularly fail to deliver their miracle promises. Many farmers are left deeply in debt. These economic problems are compounded by the negative environmental effects and health problems associated with high chemical use. The entire system is based on the premise that high yields are best produced by using genetically uniform seeds developed by ‘experts.’ The results of this study show that, not only is total on-farm diversity more important than the yield of any single crop, but that high yields can be attained by farmers without expensive and environmentally damaging chemicals using varieties bred by small farmers themselves.

Rice seed improvement has been a major focus of MASIPAG’s work in the last twenty years. The farmer-led breeding program encourages farmers to take an active part in the breeding process. Seeds are continually improved with the work carried out in a way that empowers farmers. Currently, there are 67 farmer rice breeders in MASIPAG and they have developed a total of 273 rice crosses. The results are a major achievement for the work of MASIPAG farmer-breeders and show the viability and skills of subsistence farmers as rice breeders.

Rice yields

Rice is the dominant crop in the farms studied in terms of both production and consumption. On average, participants dedicate 85% of the land area of their primary plot to rice. Where farmers have an additional plot of land, it is often unirrigated and non-
terraced on poorer, more marginal land. Such plots tend to be more diversified.

Many of the farmers involved in farmer-led sustainable agriculture grow several varieties of rice. As outlined in chapter seven, full organic farmers grow on average 4.8 rice varieties on their farm compared to 1.6 varieties for conventional farmers. In this section, average rice yields have been computed by averaging production for all varieties in mass production.

The results show that yield differences for the full organic farmers, conversion farmers and conventional farmers are not statistically significant. The average yield among all farmers is 3,388 kg per hectare. The average yields for the different groups range from 3,287 kg for conversion farmers, 3,424 kg for organic farmers and 3,478 kg for conventional farmers. This means that farmer-bred varieties grown without any chemical fertilisers or pesticides are yielding on par with chemically fertilised and pest-managed ‘expert-bred’ varieties that have benefited from millions of dollars of public and private research and development funds. When we incorporate the savings gained by organic farmers in not having to purchase inputs and include their greater non-rice production, we can see these equal yields pave the way for the better food security and income results outlined in earlier chapters.

The comparison over time shows that yields for the conventional farmers have declined slightly in all three regions. The conversion

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**Figure 4.1: Key findings**

- Rice yields are on par between the three groups
  - Average yields range between 3,287 to 3,478 kg per hectare for the three groups. Differences are not statistically significant.
  - Rice yields for conventional farmers have declined over time. For organic farmers, they have remained steady.
- High yields are supported by strong participation in rice breeding and improvement
  - The network has 67 rice breeders - 14% of all full organic farmers interviewed.
  - Seed selection is practiced by 77% of organic farmers but only 25% of conventional farmers.
group yields show the same trend. The yields for the full organic group are stable and show slight increases. The trends, however, are not statistically significant.

**Figure 4.2: Rice paddy yields 2000-2007 (kg/ha)**

<table>
<thead>
<tr>
<th>Average yields</th>
<th>Full organic farmers</th>
<th>Conversion farmers</th>
<th>Conventional farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>National average</td>
<td>3,424&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>3,374&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>3,287&lt;sup&gt;ns&lt;/sup&gt;</td>
</tr>
<tr>
<td>By area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindanao average</td>
<td>3,767&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>3,717&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>3,864&lt;sup&gt;ns&lt;/sup&gt;</td>
</tr>
<tr>
<td>Visayas average</td>
<td>2,683&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>2,429&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>2,470&lt;sup&gt;ns&lt;/sup&gt;</td>
</tr>
<tr>
<td>Luzon average</td>
<td>3,743&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>3,941&lt;sup&gt;ns&lt;/sup&gt;</td>
<td>3,436&lt;sup&gt;ns&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**The rice breeding program**

The breeding and selection of locally adapted varieties using the trial farm approach plays an extremely important role in the positive results for the MASIPAG farmers. With the seed selection and breeding in the hands of the farmers, seed selection becomes prioritised. The trial farm approach ensures that farmers can compare all varieties under their local conditions and select the most appropriate for mass production. Further, the active role of farmers in the process means increased empowerment, as well as enhanced education and training. These clearly have flow-on benefits in terms of farm management. Good nutrient management and better soil fertility also play an important role.

Full organic farmers take a very active role in maintaining seed stocks. The results show that seed selection is practiced by 77% of full organic farmers but only 25% of conventional farmers. Verification trials, where varieties are tested for their performance under local conditions, are undertaken by 70% of the full organic farmers while that practice is almost unknown to the conventional farmers. (See Figure 4.3)

By continuous seed selection, the properties of varieties can be preserved and yield levels can be maintained or even gradually improved over longer periods of time. The findings indicate that about three quarters of the full organic farmers have adopted these important seed management practices.

Particularly striking is the high number of rice breeders among the full organic farmers. Currently there are 67 farmer rice breeders in MASIPAG. The MASIPAG farmer-breeders have developed a total
of 273 rice crosses with three or more farmer-selected lines developed out of each cross. Spread all over the country, they ensure that breeding work is taking place in the remotest locations. No formal research station even of the size and reputation of the International Rice Research Institute can claim to test their varieties in so many locations, and consequently expose genetic materials to such a broad genotype environmental interaction.

The other side of the coin is that conventional farming in the Philippines also suffers from many flaws: farmers use varying quantities of fertiliser (either too much or too little), the quality of fertiliser and pesticides may be poor, and the seed quality of high yielding varieties is not as promised. Conventional farmers also tend to reuse seed from their own harvest rather than buying new seed each season. Without proper seed selection, this practice leads to declining yields over time. The effect is particularly strong for HYV seeds. Consequently, conventional yields in the study are well below those achieved in research stations where the production packages are developed.

The productivity of the full organic farms is based on a combination of their higher diversity underpinned by strong yields of the principal crop, rice. Yields of rice, in particular, are an important component of the overall system. The strength of the farmer-based sustainable agriculture approach, however, is largely due to its ability to understand all parts of the agriculture system, including the social components, as interlinked. Another important element of this productive system is livestock. It is to this that we now turn.
The carabao is indispensable to MASIPAG farmers.