## Results use survey Rwanda

#### General information

A total of 298 farmers participated in this survey, carried out in five districts. Per district, about 60 farmers were interviewed (Table 1).

Table 1: Number of farmers in survey and gender division of head of households per region

|  |  |  |  |
| --- | --- | --- | --- |
| District | Number of farmers  in survey | Male-headed  households | Female-headed households |
| Bugesera | 59 | 64% | 36% |
| Burera | 60 | 77% | 23% |
| Gakenke | 60 | 80% | 20% |
| Kamonyi | 60 | 71% | 29% |
| Kayonza | 59 | 76% | 24% |
| Total/ Average | 298 | 74% | 26% |

In the majority of households interviewed, the head of household was male. On average, about a quarter of the households were female-headed. In Bugesera this was more than one third.

In all districts, except for Kamonyi, average land sizes are below 1 ha (Table 2). Farmers in Burera and Gakenke have the smallest average land sizes, while in Kamonyi the average is almost 1.5 ha. The median land sizes are a bit lower, as outliers increase the average. The same trend is observed, however, with farmers in Kamonyi and Kayonza having the largest land sizes. Kamonyi is also the district where the smallest number of farmers has family members working on other people’s fields, and where about two-third of the farmers can afford to hire labour to work on their field. In Burera and Gakenke, a large number of farmers work on other people’s land, although at the same time a majority of farmers also hires labour. The three indicators land size, hiring and hiring out labour were taken together in a socio-economic score (see also Annex 1). This score shows that farmers in Kamonyi are relatively well-off and farmers in Bugesera relatively poor.

**Table 2: Socio-economic characteristics per region**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Average land  size (ha) | Median of land size (ha) | Family hires  out labour | Family hires labour | Average socio-economic score |
| Bugesera | 0.80 | 0.50 | 36% | 39% | 1.9 |
| Burera | 0.60 | 0.50 | 53% | 62% | 2.1 |
| Gakenke | 0.68 | 0.50 | 70% | 53% | 2.0 |
| Kamonyi | 1.43 | 1.00 | 18% | 63% | 2.8 |
| Kayonza | 0.90 | 1.00 | 46% | 41% | 2.3 |
| Average | 0.88 | 0.60 | 45% | 52% | 2.2 |

#### Cultivation of legumes and their management

Out of the 298 farmers, 289 farmers indicated they grow one or more legume crops. Only 9 farmers (3%) do not grow legumes at all. Climbing beans and bush beans are the most widely grown legumes among the farmers interviewed (Table 3). Bush bean is grown in all districts, except for Gakenke where all farmers grow climbing beans. Soybean is mainly grown in Kamonyi. In this district some farmers also grow groundnut and cowpea.

**Table 3: Percentage of fields planted with legumes per region**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Bush beans | Climbing beans | Cowpeas | Groundnuts | Soybeans | Total |
| *N* | *220* | *288* | *2* | *19* | *41* | *570* |
| Bugesera | 12% | 0% | 0% | 0.2% | 0.2% | 12% |
| Burera | 1% | 24% | 0% | 0% | 0% | 25% |
| Gakenke | 0% | 23% | 0% | 0% | 0% | 23% |
| Kamonyi | 15% | 3% | 0.4% | 3% | 7% | 28% |
| Kayonza | 11% | 0% | 0% | 0.4% | 0.2% | 12% |
| Total | 39% | 51% | 0.4% | 3% | 7% | 100% |

In most regions, farmers grow only one legume. In Bugesera and Kayonza this is bush bean, and most farmers have only one field planted with this crop (see also Table 4). In Burera and Gakenke, farmers typically grow climbing bean, but have an average of 2.4 fields planted with this crop. In Kamonyi, farmers grow a greater diversity of legumes and they also have the highest average number of fields (2.7), which can be related to the larger farm sizes in this region. The district also has the largest average area planted with legumes. The average land under legumes in Gakenke is only 0.4 ha. Intercropping is practiced mostly in Bugesera and Kayonza, where the majority of farmers grows bush bean. Remarkably, farmers in Burera grow their climbing beans as mono-crop, while half of the farmers in Gakenke grows them as intercrop.

**Table 4: Average number of fields, area under legumes, field size and cropping practice per region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average number  of fields | Average area  under legumes (ha) | Average field  size (ha) | Intercropping  (% of fields) |
| Bugesera | 1.2 | 0.16 | 0.13 | 78% |
| Burera | 2.4 | 0.11 | 0.05 | 3% |
| Gakenke | 2.3 | 0.04 | 0.02 | 53% |
| Kamonyi | 2.7 | 0.24 | 0.09 | 67% |
| Kayonza | 1.1 | 0.18 | 0.16 | 76% |
| Average | 2.1 | 0.14 | 0.07 | 50% |

The use of inputs for legumes is largely limited to application of organic and synthetic fertilizer. Only four farmers have applied inoculants (Table 5). The use of both organic and synthetic fertilizer is lowest in Bugesera, which is also the area with the lowest socio-economic score. In Gakenke, synthetic fertilizer is applied on more than 90% of the fields, and organic fertilizer on all fields. All farmers who used inoculants are from Kamonyi, where they obtained inoculants from either the cooperative Impuyabo or from COCOF (Conseil Consultatif des Femmes). On average, organic fertilizer is applied on about 80% of the fields cultivated with legumes, and synthetic fertilizer on more than one third of the fields.

**Table 5: Use of inputs on fields cultivated with legumes per region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | Inoculants | Organic fertilizer | Synthetic fertilizer |
| Bugesera | 69 | 0% | 42% | 1% |
| Burera | 142 | 0% | 97% | 54% |
| Gakenke | 133 | 0% | 100% | 92% |
| Kamonyi | 159 | 3% | 60% | 8% |
| Kayonza | 67 | 0% | 84% | 13% |
| Total/Average | 570 | 0.7% | 79% | 39% |

Climbing beans are grown on 50% of the total number of fields cultivated with legumes, followed by bush bean on about 40% of the fields (Table 6). Groundnut and soybean are grown on less than 10% of the fields, and cowpea only on two fields. The average area under legumes per farm is largest for bush bean. Climbing beans, groundnuts and soybeans are generally cultivated on less than 0.10 ha. The average seed used relates fairly well to the area under cultivation, although the rates mentioned for groundnut seem to be too high compared to typical seed rates, and too low for bush bean.

**Table 6: Number of farmers growing legumes, area under legumes, amount of seed used and seed rates**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | % of fields planted with legume | Average area  under legumes (ha) | Average seed  used (kg) | Average seed  rate (kg/ha) |
| Bush beans | 220 | 39% | 0.26 | 11 | 41 |
| Climbing beans | 288 | 51% | 0.07 | 6 | 83 |
| Cowpeas | 2 | 0.4% | 0.11 | 4 | 39 |
| Groundnuts | 19 | 3% | 0.05 | 6 | 108 |
| Soybeans | 41 | 7% | 0.08 | 6 | 74 |
| Total/ Average | 570 | 100% | 0.14 | 8 | 55 |

The majority of farmers practices intercropping in bush bean, cowpea and groundnut. Climbing bean and soybean are mostly grown as sole crop (Figure 1).

**Figure 1: Percentage of farmers practicing mono- or intercropping for different legumes**

Bush beans and climbing beans are generally intercropped with maize, cassava and bananas (Table 7). Groundnuts and soybean are mostly intercropped with cassava. The two farmers growing cowpea both plant them together with potatoes.

**Table 7: Most frequently mentioned crops for intercropping with legumes**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | N | Maize | Cassava | Bananas | Potatoes | Coffee |
| Bush beans | 169 | 54% | 20% | 5% | 2% | 2% |
| Climbing beans | 91 | 66% | 27% | 2% |  |  |
| Cowpeas | 2 |  |  |  | 100% |  |
| Groundnuts | 14 |  | 71% |  | 14% |  |
| Soybeans | 11 | 18% | 36% |  | 18% | 18% |

All farmers applying inoculants did so with soybean (Table 8). The use of organic fertilizer is also relatively high for this crop, together with bush and climbing bean. Synthetic fertilizer is applied on two-third of the fields with climbing bean, and on about a quarter of the fields with soybean. In bush bean, cowpea and groundnut (almost) none of the farmers applies synthetic fertilizer. The main synthetic fertilizer used for climbing bean, bush bean and soybean is DAP. A minority of farmers applies NPK, DAP with NPK or DAP with urea (data not presented).

**Table 8: Use of inputs on percentage of fields cultivated with legumes**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | Inoculants | Organic fertilizer | Synthetic fertilizer | Other N2Africa technologies |
| Bush beans | 220 | 0% | 63% | 6% | 25% |
| Climbing beans | 288 | 0% | 97% | 68% | 61% |
| Cowpeas | 2 | 0% | 0% | 0% | 50% |
| Groundnuts | 19 | 0% | 11% | 0% | 0% |
| Soybeans | 41 | 10% | 76% | 27% | 29% |
| Total/ average | 570 | 0.7% | 79% | 39% | 43% |

For 60% of the climbing bean fields, farmers indicate they apply other N2Africa technologies. These technologies include row cropping, crop rotation and row spacing (Table 9). Other technologies are also applied on about one quarter of the bush bean and soybean fields. These technologies are mainly plant spacing, intercropping and row spacing in bush bean, and crop rotation, respecting planting time and row spacing in soybean.

**Table 9: Specification of use of other N2Africa technologies (% of farmers applying other technologies)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | N | Alternate  maize + bean  lines | Crop  rotation | Inter-  cropping | Org. + synth.  fertilizer | Pesticide | Plant  spacing | Planting  time | Row  cropping | Row  spacing | Other\* |
| Bush Beans | 55 |  | 5% | 11% |  |  | 53% | 4% | 9% |  | 2% |
| Climbing Beans | 175 | 3% | 17% | 1% | 2% | 1% |  | 7% | 30% | 5% | 1% |
| Cowpeas | 1 |  |  |  |  | 100% |  |  |  |  |  |
| Soybeans | 12 |  | 8% |  |  |  |  | 8% |  | 8% | 8% |

\* Including seed multiplication, seed rate, type of variety

There is not much difference between farmers with a low and a high socio-economic score and their choice for a type of legume (Table 10). The majority of farmers in all classes grow climbing bean and bush bean. Only in the ‘average’ socio-economic class clearly more farmers grow climbing bean than bush bean. Groundnuts and soybean are mainly grown by farmers in the wealthier class, although there are also farmers in the two lower socio-economic classes who grow them. The two farmers growing cowpea are both among the wealthier farmers. When only land size is related to the cultivation of legumes, there is a distinction between the crops grown by farmers with larger and smaller areas of land. The farmers with larger land sizes tend to grow climbing beans at the cost of bush beans, as compared to farmers with small or average land sizes. The other crops show a similar distribution within land size categories.

**Table 10: Cultivation of legumes by socio-economic class and by land size**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | N | Bush Beans | Climbing Beans | Cowpeas | Groundnuts | Soybeans | Grand Total |
| *Socio-economic status* | | | | | | | |
| Poor | 73 | 44% | 48% | 0% | 2% | 6% | 100% |
| Average | 231 | 35% | 58% | 0% | 1% | 6% | 100% |
| Wealthier | 266 | 39% | 42% | 1% | 8% | 10% | 100% |
| *Land size\** |  |  |  |  |  |  |  |
| Small | 159 | 48% | 43% | 0% | 1% | 8% | 100% |
| Average | 244 | 42% | 45% | 1% | 5% | 8% | 100% |
| Large | 167 | 25% | 66% | 0% | 4% | 5% | 100% |

\* For categories of land sizes, see Annex 1

Organic fertilizer is used on about 80% of the fields of poor farmers, while synthetic fertilizer is used on more than one third of the fields (Table 11). The use of these two inputs is slightly higher in the ‘average’ socio-economic class but, remarkably, fewer wealthier farmers use these inputs on their fields. The farmers who applied inoculants are all wealthier farmers. A higher percentage of farmers in the poor class indicate that they apply other N2Africa technologies than in the wealthier class. When only farm size is linked to the use of inputs, the differences between types of farmers become less distinct.

**Table 11: Use of inputs by socio-economic class and land size**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | Inoculants | Organic fertilizer | Synthetic fertilizer | Other N2Africa technologies |
| *Socio-economic status* | | | | | |
| poor | 73 | 0% | 81% | 38% | 47% |
| average | 231 | 0% | 82% | 45% | 45% |
| wealthier | 266 | 2% | 74% | 31% | 36% |
| *Land size\** |  |  |  |  |  |
| Small | 159 | 0% | 22% | 10% | 10% |
| Average | 244 | 0.5% | 33% | 15% | 19% |
| Large | 167 | 0.2% | 24% | 14% | 13% |

\* For categories of land sizes, see Annex 1

Considering the use of other N2Africa technologies, it could be expected that farmers with smaller land sizes would have more difficulties to practice crop rotation, and potentially would also prefer intercropping. There is no difference, however, in the percentage of farmers mentioning crop rotation or intercropping between classes of land sizes (data not presented).

Other parameters that could influence the choice for a certain legume could be the farmers’ sex or his/her role in the project (lead or satellite farmer). There is not much difference in the percentage male or female farmers indicating that they grow a certain crop. Climbing bean and soybean are grown by slightly more female than male farmers, while for bush bean and groundnuts this is reversed (Figure 2).

Figure : Percentage of male and female farmers growing legumes

All four farmers applying inoculants are male (Figure 3). A slightly higher percentage of male than female farmers indicate that they use organic fertilizer (82% male against 77% female), whereas the use of synthetic fertilizer is higher among female than male farmers (37% male and 44% female).

**Figure 3: Percentage of male and female farmers using inputs**

For all inputs, a higher percentage of lead than of satellite farmers indicates to use them (Figure 4). Especially the use of synthetic fertilizer is much higher among lead than among satellite farmers (62% and 34% respectively).

**Figure 4: Percentage of lead and satellite farmers using inputs**

One reason for this difference could be a difference in socio-economic status between lead and satellite farmers. Among lead farmers, 17% has a small farm size, while almost 40% has a large farm size (Table 12). Among satellite farmers this is reversed: one third has a small land area and less than a quarter a large area. Taking into account the other socio-economic variables as well, this picture is confirmed: only 7 percent of the lead farmers is classified as poor, while this is almost 30% of the satellite farmers. In contrast, over 40% of the lead farmers are wealthier, compared to one quarter of the satellite farmers.

**Table 12: Land size and socio-economic status of lead and satellite farmers**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Land size* | | | | *Socio-economic status* | | | |
|  | Small | Average | Large | Total | Poor | Average | Wealthier | Total |
| Lead Farmer | 17% | 43% | 39% | 100% | 7% | 52% | 41% | 100% |
| Satellite Farmer | 33% | 44% | 23% | 100% | 29% | 45% | 26% | 100% |

This means that the lead farmers who are selected within N2Africa tend to belong to the wealthier households in their region, and are therefore probably better endowed to adopt N2Africa technologies than most of the other farmers in the region. On the other hand, since socio-economic factors per se did not affect use of technologies so much, the more intensive contact with the project and/or a better understanding of the advantages of the technologies may also have increased the use of technologies among lead farmers.

#### Farmers not growing legumes

Only 9 of the 298 farmers interviewed (3%) do not grow legumes at all. The reason that these farmers give for not growing legumes is that they do not have land available for legumes (5 farmers) and that their land is not suitable to grow legumes (2 farmers). The average land size of the farmers not growing legumes is 0.69 ha, compared to an overall average of 0.88 ha (Table 13). Those indicating that they do not have land available for legumes own an even lower average of 0.62 ha. Other indicators also show that their socio-economic status is lower than the general average, with more farmers indicating that they work on other farmers’ land, and that they do not hire labour to work on their own fields.

**Table 13: Average land size and other socio-economic indicators for farmers not growing legumes (compared to general average)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | Average land  size (ha) | Work on other people’s land | No labour hired |
| Bugesera | 4 | 0.60 | 50% | 50% |
| Gakenke | 2 | 0.75 | 50% | 100% |
| Kayonza | 3 | 0.77 | 66% | 67% |
| Total/Average | 9 | 0.69 | 56% | 67% |
| *General average* |  | *0.88* | *45%* | *48%* |

#### Reason for (non-)use of technologies

It is not clear from the data set how many farmers who received inputs in an N2Africa package actually use them on their field this year. There is a discrepancy between part C and part D of the survey, with much more farmers indicating that they use the technology in part D than in part C. Furthermore, none of the farmers not using a certain component of the N2Africa technologies gave reasons for not using them. Only for farmers who indicate that they do not grow climbing beans it is specified that the variety Kaki suffers from attacks by birds, and that climbing bean is not well adapted to the climate (high rainfall during the season reduced yields).

For farmers who did use one or all of the technology components, the most important reasons are higher yields (for varieties and inputs) and labour savings (for management practices). For bush bean, high yield is the most important reason for farmers to grow it, followed by grain quality (meaning the variety) and the taste (Figure 5). Especially the variety RWR 2245 is liked for the latter two reasons. Also in terms of market demand and prices this variety is appreciated.

**Figure 5: Reasons for use of bush bean varieties**

About 75 to 80% of the farmers growing climbing beans indicate that the high grain yields and the taste are reasons to grow them (Figure 6). Especially the high yield of variety Kaki is mentioned as a reason for the use of this variety. The grain quality is mostly mentioned for variety Gasilida.

**Figure 6: Reasons for use of climbing bean**

Also for soybean, many farmers appreciate the higher yield and grain quality, which is most often mentioned for variety PK6 (Figure 7). The better taste is most frequently mentioned for variety SB24.

**Figure 7: Reasons for use of soybean**

The most important reason for farmers to use fertilizer and inoculants is the higher yield (Table 14). Grain quality and better taste are mentioned by a minority of farmers.

**Table 14: Reasons for use of inputs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | higher yield | grain quality | better taste |
| Fertilizer | 220 | 75% | 2% | 1% |
| Inoculation | 72 | 46% | 1% | 0% |

For improved management practices of row cropping and row spacing, saving labour is the most frequently mentioned reason (Table 15). This is interesting, since initially this type of planting is more labour intensive than broadcasting and it only reduces labour for weeding. But for these farmers, the advantages during weeding outweigh the increased labour demand during planting. Improved grain quality is also mentioned as a reason for practicing row cropping and row spacing. Timely planting is mostly practiced because it gives higher yields. There were no reasons mentioned for crop rotation.

**Table 15: Reasons for use of management practices**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | higher yield | grain quality | saves labour |
| Crop rotation | 3 | 0% | 0% | 0% |
| Row cropping | 163 | 1% | 10% | 47% |
| Row spacing | 44 | 2% | 61% | 77% |
| Timely planting | 68 | 22% | 4% | 0% |

#### Conclusions

Results of this survey show that 97% of the farmers in this survey grow legumes, on an average of 0.88 ha. The farmers that do not grow legumes do not have land available for legumes or indicate their land is not suitable to grow legumes. The socio-economic status and land size of these farmers is lower than average.

Bush bean and climbing bean are the most popular legumes in Rwanda, but there are strong regional differences. In Bugesera and Kayonza farmers mainly grow bush bean and in Burera and Gakenke climbing bean is the most popular legume. In Kamonyi, farmers grow a greater diversity of legumes, which is probably also be related to the larger farm sizes in this region. Bush bean and groundnut are mainly grown in intercropping, while most farmers grow climbing bean and soybean as monocrops.

The use of inputs is highest in climbing beans, with organic fertilizer applied on 97% of the fields, and synthetic fertilizer on 68%. In soybean, over 75% of the fields received organic and 27% synthetic fertilizer. The use of synthetic fertilizer on bush bean is only 6%. Inoculants are used by only four farmers, all on soybean. This low percentage is a clear indication that the availability of inoculants should be improved. Other N2Africa technologies frequently applied include row cropping, crop rotation and improved row spacing.

Land size, socio-economic status and gender were all not distinctive for the choice of a particular crop or the use of inputs. The role of the farmer in the project was, however. Lead farmers showed a higher use of organic and especially synthetic fertilizer, as well as of other technologies. Further analysis showed that these farmers were relatively wealthy compared to the satellite farmers. This, together with their more intensive contact with the project, probably increases their ability to adopt technologies.

Unfortunately, no reasons for non-use of technologies were filled in in the survey. Farmers who do use the technologies appreciate the higher yields obtained by new varieties or inputs, and labour savings from improved management practices.

## Annex : Socio-economic score

The use survey included some questions that give an indication of the socio-economic status of the farmers interviewed. These are land size, one of the family members working on other people’s land, and being able to hire labour to work on their own field. A fourth question considering the use of inputs was also asked, but this question was answered with ‘yes’ for all farmers, except for farmers in Bugesera. This question is therefore not distinguishing within any of the districts. The sum of the first three socio-economic indicators was calculated to get a socio-economic score. The higher the score, the wealthier the household is considered to be:

* working on other people’s land: yes=0 and no=1;
* hiring labour: yes=1 and no=0;
* farmers’ land size differed between the districts. In Kamonyi, generally, farm sizes were much larger than in the other districts, and hence a small farmer in this district would be classified as a big farmer in another. Therefore, different class sizes were distinguished for each of the districts (Table A1).

**Table A1: Categories for land size**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bugesera | | Burera | | Gakenke | | Kamonyi | | Kayonza | |
| Score | Land area (ha) | N | Land area (ha) | N | Land area (ha) | N | Land area (ha) | N | Land area (ha) | N |
| 0 | <0.5 | 28 | <0.5 | 15 | <0.5 | 16 | <1 | 23 | <0.5 | 10 |
| 0.5 | 0.5-1.5 | 24 | 0.5 | 26 | 0.5-1 | 20 | 1 to 2 | 24 | 0.5-1 | 37 |
| 1 | >1.5 | 7 | >0.5 | 19 | ≥1 | 24 | >2 | 13 | >1 | 12 |

Farmers with a score of 0 or 0.5 were categorized ‘poor’, scores 1, 1.5 and 2 were ‘average’, and 2.5 and 3 ‘wealthier’.