**Results Use Survey Zimbabwe season 2011-2012**

**Summary/Conclusions**

Almost all surveyed farmers cultivated legumes in the year succeeding N2Africa input distribution. However, these were not always the legumes that were received with the N2Africa package. ‘Use’ of legumes in the year after the N2Africa packages were distributed ranged from 47% for soybean, 61% for common bean and cowpea to 96% for groundnut. On average, legumes were usually cultivated on about 10% of the cropped area. Of all legumes, groundnut was grown by the largest number of farmers and was allocated the largest average area.

Many farmers used accompanying techniques for legume cultivation such as specific plant and row spacing and planting dates during the survey season. A smaller proportion of farmers used fertilizers (synthetic and organic) and/or inoculants. Generally less than 1/3 of the farmers still cultivated the same legume in combination with fertilizer in the season after the technologies were distributed. 41% of the farmers still used inoculants in combination with soybean in the year succeeding input distribution, whereas this was only 3-4% for cowpea and groundnut and 14% for common bean. The combination of fertilizer and inoculation was used by 13% of the farmers who received these technologies with common bean, by 8% of the farmers who received these technologies with soybean, and by 0% to 2% by farmers who received these technologies with cowpea and groundnut respectively. Used inoculants in the 2011-2012 season originated in all districts for the largest part from a distributing organization. Only few farmers bought inoculants from an agro-dealer or whole-sale shop.

Reasons for farmers to not use fertilizer, inoculants and pesticides were mainly based on the product not being available or too expensive. For the farmers who did use these techniques, high yield was the most important reason.

Although there were no pronounced differences in farm and household size between male and female headed households and Lead and Satellite farmers, more female than male headed households hired labour and more Lead Farmers than Satellite Farmers hired out labour. This is in contrast with the view that male or lead farmers are often better resource endowed than female or satellite farmers and thus are in a better position to hire labour and do less often have to work on other family’s land. Yet, there were differences in use of techniques. Lead farmers more often applied inoculants, synthetic fertilizer and other N2Africa techniques than Satellite farmers and male farmers applied inoculants more often than female farmers.

**General information**

Between 25-06-2012 and 07-07-2012 317 farmers were surveyed for the Use Survey in Zimbabwe. Farmers were surveyed in Chegutu, Goromonzi, Makoni and Murehwa. In all districts, more female than male farmers participated in the survey (Table 1). Few Lead Farmers participated in the survey, especially in Murehwa. Although, except for Murehwa, the majority of participating Lead Farmers was also female, the proportion female Lead Farmers was smaller than the total proportion of female farmers (Table 2). The average age of the surveyed farmers was 48 for the women and 51 for the men (data not shown).

Table 1. Overview of surveyed farmers.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| District | No. of farmers | Male | Female | Lead | Satellite |
| Chegutu | 75 | 27% | 73% | 17% | 79% |
| Goromonzi | 74 | 20% | 80% | 24% | 76% |
| Makoni | 86 | 21% | 79% | 23% | 77% |
| Murehwa | 80 | 39% | 61% | 6% | 94% |
| Blank | 2 | 0% | 100% | 0% | 100% |
| *Total* | *317* | *26%* | *74%* | *18%* | *81%* |

Table 2. Overview of participating Lead and Satellite Farmers.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| District | No. of Lead Farmers | Female | Male | No. of Satellite Farmers | Female | Male |
| Chegutu | 13 | 69% | 31% | 59 | 75% | 25% |
| Goromonzi | 18 | 72% | 28% | 56 | 82% | 18% |
| Makoni | 20 | 55% | 45% | 66 | 86% | 14% |
| Murehwa | 5 | 40% | 60% | 75 | 63% | 37% |
| *All districts* | *56* | *63%* | *38%* | *258* | *76%* | *24%* |

Average household sizes and average and median farm sizes were approximately equal in all districts (Table 3). Except for Murehwa, more farmers hired labour than that they hired out labour. Overall, there were no pronounced differences in farm size between male and female headed households and Lead and Satellite farmers (Table 4). However, more female than male headed households hired labour and more Lead Farmers than Satellite Farmers hired out labour.

Table 3. Socio-economic characteristics of households per district.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| District | n | Average HH size | Male-headed HH | Average farm size (ha) | Median farm size (ha) | Household hires labour | Household hires out labour |
| Chegutu | 75 | 5.8 | 68% | 2.3 | 2.0 | 52% | 37% |
| Goromonzi | 74 | 5.6 | 65% | 2.1 | 2.0 | 63% | 21% |
| Makoni | 86 | 5.7 | 56% | 2.1 | 2.0 | 46% | 31% |
| Murehwa | 80 | 5.6 | 59% | 2.1 | 2.0 | 36% | 38% |

Table 4. Socio-economic characteristics of male versus female headed households and lead versus satellite farmers.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | n | Average farm size | Household hires labour | Household hires out labour |
| Female | 233 | 2.2 | 54% | 34% |
| Male | 84 | 2.1 | 45% | 32% |
| Lead farmer | 56 | 2.0 | 52% | 46% |
| Satellite farmer | 258 | 2.1 | 48% | 30% |

**Received N2Africa packages in the 2010-2011 season**

Table 5 shows the percentages of farmers per region that received seed for common bean, cowpea, groundnut or soybean with the N2Africa package during the 2010-2011 season. Almost all farmers who received common bean or soybean indicated that they also received inoculants. Also a majority of the groundnut farmers received inoculants. In general, the majority of farmers indicated to have received fertilizer with the legume seed. SSP (in combination with lime) was the most mentioned fertilizer, in all districts and with all crops. Relatively few farmers mentioned that their package included Compound D. Only in Murehwa, 35% of the farmers indicated that they received pesticides, which seemed to be irrelevant of legume type. In the other districts, none of the farmers indicated to use pesticides (data not shown).

Table 5. Overview of received legume seed in the 2010-2011 season. Percentages relate to the numbers of farmers that received the particular legume seed.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | No. of surveyed farmers | Common bean | Cowpea | Groundnut | Soybean | unknown |
| Chegutu | 75 | 28% | 9% | 40% | 23% | 0% |
| Goromonzi | 74 | 26% | 12% | 7% | 54% | 1% |
| Makoni | 86 | 7% | 14% | 38% | 13% | 28% |
| Murehwa | 80 | 51% | 11% | 24% | 11% | 3% |

**Legume cultivation in the 2011-2012 season**

***Areas and cropping systems***

In all districts there were only few farmers that did not cultivate any legumes (Table 6). Groundnut was cultivated by the largest number of farmers. Despite the longer history of soybean cultivation in Chegutu, not many surveyed farmers cultivated this crop in this area.

Table 6. Overview of farmers cultivating legumes. Percentages relate to the numbers of farmers cultivating the particular legume.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | n | Bambara nut | Common bean | Cowpea | Groundnut | Soybean | No legumes |
| Chegutu | 75 | 5% | 25% | 35% | 92% | 12% | 4% |
| Goromonzi | 74 | 0% | 50% | 28% | 81% | 36% | 3% |
| Makoni | 86 | 0% | 28% | 33% | 94% | 16% | 2% |
| Murehwa | 80 | 5% | 51% | 31% | 89% | 9% | 3% |

The average area under legumes per farm was lowest in Makoni. Whereas the share of legumes in the cropping systems was approximately equal for Murehwa, Goromonzi and Chegutu, legumes comprised a much smaller share of the total cropping area in Makoni. However, also in the other districts the share of legumes seems to be small, with only around 10% of the area allocated to legumes. Differences between average legume areas of male and female farmers, male and female headed households, and Lead and Satellite farmers were small (Figure 1). Besides being the most popular legume in terms of the number of farmers cultivating it, groundnut also had the largest total average area compared to the other grain legumes.

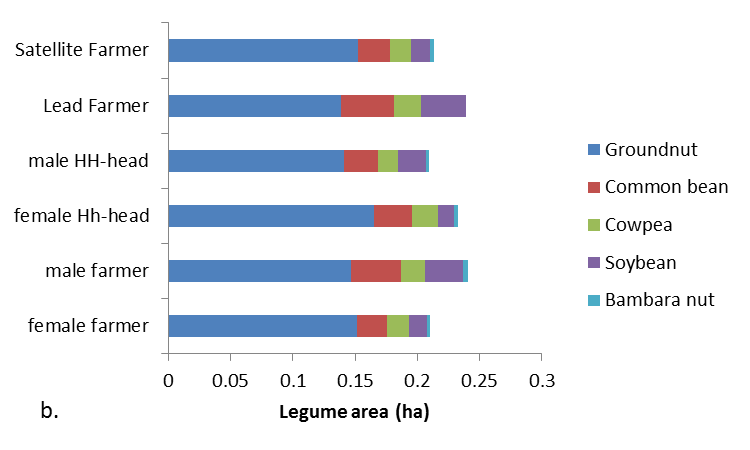
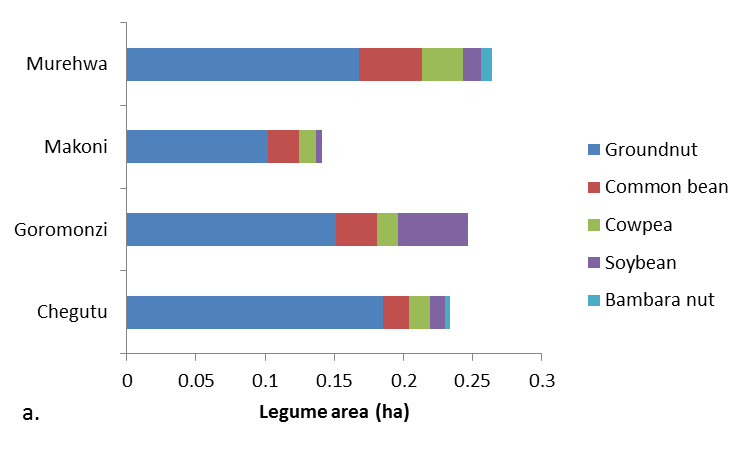


Figure 1. Average legume areas per farm, categorised per district (a) and per type of farmer (b).

Most legumes were grown as sole crop rather than being intercropped (Table 7). In case farmers intercropped, it was mainly cowpea, and in Makoni also common bean, intercropped with maize. Typically, the legume-maize proportion was about 1:2 (data not shown).

Table 7. Proportion of the legume fields that were intercropped with (mainly) maize, with on average 37% legumes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Common bean | Cowpea | Groundnut | Soybean |
| Chegutu | 0% | 35% | 0% | 0% |
| Goromonzi | 3% | 5% | 2% | 7% |
| Makoni | 25% | 36% | 1% | 7% |
| Murehwa | 3% | 24% | 3% | 0% |

***Use of inputs in legume fields***

Since only few farmers mentioned the cultivation of Bambara nut, this crop has been excluded from the overview on input use.

*Fertilizers*

Generally, synthetic fertilizers were used more often than organic fertilizers. In Chegutu, organic fertilizer was mostly allocated to cowpea. In Makoni most of the organic fertilizer was targeted to soybean. In the other districts there seemed to be no real preference for allocating organic fertilizer to a specific legume. Generally, common bean fields were allocated synthetic fertilizer most often and groundnut fields less often.

Table 8. Percentage of fields that were allocated organic fertilizers, per legume crop.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Common bean | Cowpea | Groundnut | Soybean | All legume fields |
| Chegutu | 6% | 22% | 9% | 0% | 9% |
| Goromonzi | 16% | 10% | 18% | 19% | 17% |
| Makoni | 33% | 29% | 11% | 43% | 21% |
| Murehwa | 18% | 28% | 27% | 29% | 26% |

Table 9. Percentage of fields that were allocated synthetic fertilizers (including lime and gypsum), per legume crop.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Common bean | Cowpea | Groundnut | Soybean | All legume fields |
| Chegutu | 53% | 48% | 24% | 44% | 33% |
| Goromonzi | 70% | 38% | 40% | 48% | 49% |
| Makoni | 71% | 43% | 22% | 71% | 38% |
| Murehwa | 51% | 17% | 19% | 57% | 29% |

Fertilizer use varied per district. In Chegutu and Goromonzi the mostly used fertilizer for legumes was Compound D, sometimes used in combination with Ammonium Nitrate. SSP was used more frequently in Makoni and Murehwa, often in combination with lime or gypsum. Few farmers applied single Ammonium Nitrate and some farmers just applied lime or gypsum. Gypsum was used only in groundnut and ammonium nitrate was not used in soybeans. Otherwise it seems that the same fertilizers were used for the various legumes (data not shown).

Distinguishing between fields where legumes were growing as a sole crop or where they were being intercropped with maize, shows that intercropped fields proportionally were allocated fertilizers more often than fields where legumes were grown as sole crops, since farmers usually apply fertilizers to maize. However, the number of fields that is intercropped is relatively small.

Table 10. Comparing use of organic and synthetic fertilizer in intercropped versus non-intercropped legume fields.

|  |  |  |  |
| --- | --- | --- | --- |
|  | n | Organic fertilizer | Synthetic fertilizer |
| Intercropped | 43 | 47% | 45% |
| Non-intercropped | 527 | 17% | 37% |

*Inoculants*

Generally, inoculants were mostly used on soybean, followed by common bean. Inoculation was most used in Makoni and least in Chegutu. This is interesting, because Chegutu has a longer history of soybean cultivation, and soybean should be relatively easy to market due to Chegutu’s proximity to Harare.

Table 11. Proportion of legume fields that were inoculated.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Common bean | Cowpea | Groundnut | Soybean |
| Chegutu | 16% | 0% | 0% | 33% |
| Goromonzi | 20% | 10% | 7% | 30% |
| Makoni | 29% | 18% | 3% | 57% |
| Murehwa | 22% | 0% | 6% | 43% |

When asked about awareness, the majority of farmers indicated to have heard about both nodules and inoculants (Table 12). Most of the farmers thought that root nodules were beneficial for a legume (Table 13).

However, at the same time less than a quarter off all surveyed farmers inoculated seeds for their own farms (Table 12).

Table 12. Percentages of farmers that heard about nodules and inoculants and the percentage of farmers that used them in one or more of their fields.

|  |  |
| --- | --- |
|  | % farmers (n=317) |
| Heard about root nodules | 95% |
| Heard about inoculants | 91% |
| Inoculated current season | 23%1 |

1 The proportion of farmers that inoculated seeds in the current season does not necessarily correspond to figures derived from Table 11, where calculations have been made on a field basis.

Table 13. Farmers’ opinions about root nodules.

|  |  |
| --- | --- |
| Opinion | % of farmers (n=317) |
| Beneficial | 80% |
| Harmful | 4% |
| Useless | 2% |
| No influence/impact | 2% |
| Uncertain | 5% |
| No opinion | 6% |
| Blank | 3% |

Many farmers who used inoculants indicated to have received them from organizations (other than N2Africa). Except for Chegutu (and despite its proximity to Harare), in all districts a few farmers indicated to have bought inoculants from an agro-dealer or wholesale shops. Some farmers accessed inoculants through other farmers, either bought or given. In Makoni some farmers seemed to have used inoculants from previous season.

Table 14. Source of inoculants per district.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| n | Chegutu | Goromonzi | Makoni | Murehwa |
| 6 | 21 | 22 | 18 |
| Organization (Agritex, CTDT or CADS) | 50% | 29% | 59% | 39% |
| Agro Dealer/wholesale shop | 0% | 14% | 9% | 11% |
| Bought from another farmer | 0% | 5% | 0% | 0% |
| Given by other farmers | 17% | 10% | 5% | 11% |
| Previous season | 0% | 0% | 14% | 0% |
| National tested seeds | 33% | 0% | 0% | 0% |
| SPRL Marondera | 0% | 5% | 0% | 0% |
| blank | 0% | 38% | 14% | 33% |

46% of the farmers who used inoculants indicated that they had stored the inoculants on their farms (data not shown). Of the 28 farmers that indicated how they stored it, about half stored it in a particular cool place (Table 15). However, when farmers indicated that inoculants were stored in a pot or container or in the storeroom, this could also mean that the inoculant was stored in a cool place. The majority of the farmers stored the inoculants for less than a week (Table 16).

Table 15. Storing methods of inoculants used by farmers. Other indicates at ‘safely in the house’, ‘in a plastic bag in a bucket’ or ‘under the bed’.

|  |  |
| --- | --- |
| Storing method | % farmers (n=28) |
| Cool dry place | 39% |
| On the floor | 14% |
| In a pot/container | 11% |
| Refrigerator | 11% |
| In a wardrobe | 7% |
| In the storeroom | 7% |
| Other | 11% |

Table 16. Time farmers stored the inoculant at their farms.

|  |  |
| --- | --- |
| Storing time | % farmers (n=30) |
| Between 1 and 2 months | 3% |
| Between 1 and 4 weeks | 10% |
| Less then a week | 80% |
| More than 6 months | 7% |

Only two farmers out of 80 did not use adhesive when inoculating the seeds (data not shown). 87% of the farmers planted immediately after inoculation, and only a few waited for a day (Table 17).

Table 17. Planting time after inoculating seeds.

|  |  |
| --- | --- |
| Time between inoculation and panting | % farmers (n=62) |
| Planted immediately | 87% |
| One to two hours | 10% |
| Planted next day | 3% |

*Other techniques*

Many farmers indicated that they applied techniques learned in N2Africa other than fertilizers and inoculation in their legume fields, especially in the case of soybean and common bean. Other N2africa techniques referred mainly to plant and row spacing, in about 1/3 of the cases in combination with planting time. A few farmers mentioned that they started harvesting cowpea leaves for relish. Also (very) few farmers mentioned that they applied techniques as intercropping, rotation, planting on ridges, mulching and, in the case of cowpea, spraying.

Table 18. Percentage of legume fields where farmers applied other N2Africa techniques.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Common bean | Cowpea | Groundnut | Soybean |
| Chegutu | 84% | 73% | 59% | 89% |
| Goromonzi | 81% | 81% | 72% | 85% |
| Makoni | 78% | 67% | 70% | 86% |
| Murehwa | 58% | 56% | 39% | 86% |

Considering gender and role of the farmer in the previous season, there were some differences in use of technologies by farmers of these different groups. Although still few, more than twice as many Lead than Satellite Farmers used inoculants (Figure 2). Also more male than female farmers used inoculants. Whereas organic fertilizers were used slightly more often by female than male farmers and by more Satellite than Lead Farmers, this pattern seemed to be the reverse for the application of synthetic fertilizer. Also other techniques were applied a little more often by Lead Farmers than by Satellite Farmers. All in all, the difference in use of techniques seemed to be larger between Lead and Satellite Farmers than between male and female farmers.

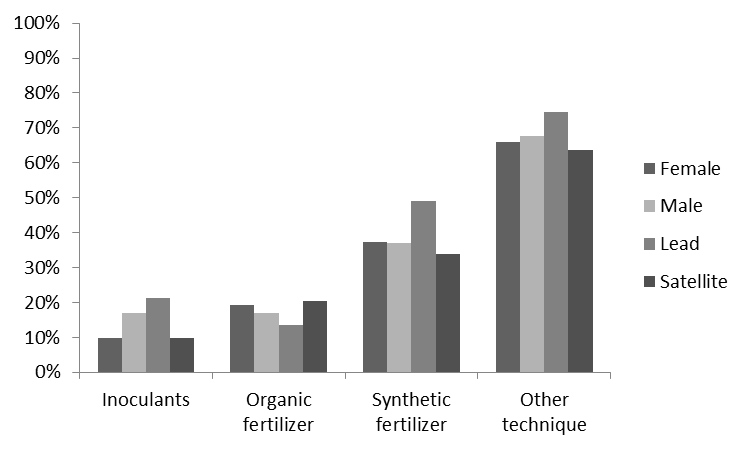
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Figure 2. Percentages of Female, Male, Lead and Satellite farmers that applied a technique (based on field level data). In this case, use of inoculants was not only restricted in soybean fields, but represents its use in all grain legumes.

**Legume yields**

On average, farmers seemed to have achieved good legume grain yields (Figure 3). Generally, yields were highest in Goromonzi and Makoni, and lowest in Murehwa (data not shown). Also, grain yields varied greatly among individual farmers.

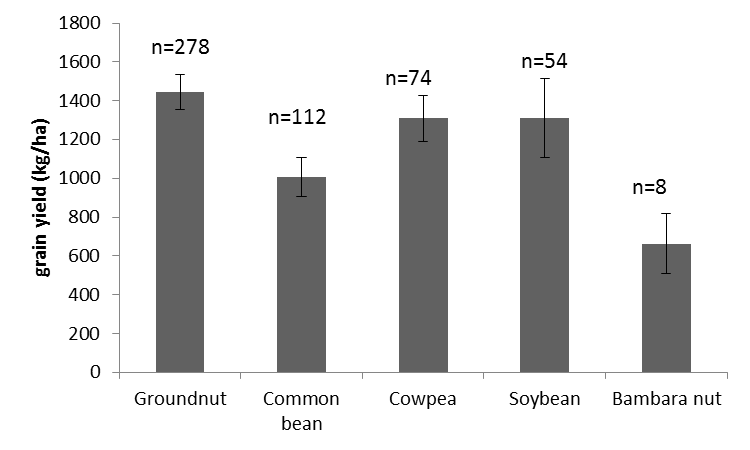


Figure 3. Average yields of mono-cropped grain legumes in the 2011-2012 season. Error bars represent sem. (Although these yields can give a good impression, the data should be treated cautiously, since yields and areas were reported rather than measured.)

**Use of legume technologies**

*Use of legumes and technologies*

In general, very few farmers did not grow legumes. Reasons mentioned for not growing legumes mainly considered labour shortage, and in very few cases lack of land and legume seed. One farmer who did not cultivate legumes did not mention any reason.

Looking at specific use of distributed technologies in the year succeeding the distribution, groundnut was cultivated by almost all farmers in the succeeding year, whereas soybean was still cultivated by less than half of the farmers. Common bean and cowpea were still cultivated by about 2/3 of the farmers (Table 19). However, these numbers do not provide information about actual increase in use, since past use of these legumes was not known.

Table 19. Use of legumes in the season succeeding the season of distribution of seed.

|  |  |  |
| --- | --- | --- |
|  | no. of farmers that received this legume in 2010-2011 | % of farmers that cultivated this legume in 2011-2012 |
| Common bean | 82 | 61% |
| Cowpea | 38 | 61% |
| Groundnut | 85 | 96% |
| Soybean | 76 | 47% |

Concerning use of inoculants, only very few farmers that indicated to have received inoculants with cowpea or groundnut still cultivated and inoculated this crop in the succeeding season. However, some farmers did inoculate other legumes. With soybean on the other hand, 41% of the farmers still cultivated and inoculated soybean in the next season (Table 20). Comparing with Table 19 indicates that almost all soybean farmers who received a N2Africa soybean package in 2010-2011 and who still cultivated soybean in 2011-2012 inoculated their soybean in the latter season.

Table 20. Use of inoculants in the season succeeding the season of distribution.

|  |  |  |  |
| --- | --- | --- | --- |
| Legume received in 2010-2011 | no. of farmers that received accompanying inoculants in 2010-2011 | % of farmers that cultivates and inoculates this legume in 2011-2012 | % of farmers inoculating another legume in 2011-2012 |
| Common bean | 77 | 14% | 13% |
| Cowpea | 30 | 3% | 10% |
| Groundnut | 66 | 5% | 11% |
| Soybean | 74 | 41% | 8% |

From the farmers that received fertilizer, generally less than 1/3 still cultivated the same legume and used fertilizer with that legume in the season after the technologies were distributed. However, many farmers used fertilizer on different legumes (Table 21).

Table 21. Use of fertilizers in the season succeeding the season of distribution. Fertilizer was sometimes distributed together with lime or gypsum. Farmers that indicated to have only received lime or gypsum were excluded from this analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| Legume received in 2010-2011 | no. of farmers that received accompanying fertilizer in 2010-2011 | % of farmers that cultivates and uses fertilizer on this legume in 2011-2012 | % of farmers using fertilizer on a different legume in 2011-2012 |
| Common bean | 70 | 34% | 30% |
| Cowpea | 29 | 24% | 45% |
| Groundnut | 76 | 30% | 37% |
| Soybean | 68 | 18% | 53% |

Looking at use of both inoculant and fertilizer, only 8% of the farmers who received soybean together with inoculant and fertilizer still used the combination of these techniques in the season after input distribution. Also for common bean, cowpea and groundnut, the combination of inoculants and fertilizer was used less often than than only one of these components. However, there were also farmers that did use the combination of fertilizer and inoculants on other legumes than received in their package.

Table 22. Use of fertilizer in combination with inoculation in the season succeeding the season of distribution. Note: no 100% certainty that techniques are applied in the same field.

|  |  |  |  |
| --- | --- | --- | --- |
| Legume received in 2010-2011 | no. of farmers that received both accompanying inoculant and fertilizer | % of farmers that cultivates and uses both fertilizer and inoculant with the same legume in 2011-2012 | % of farmers that used both fertilizer and inoculant with another legume in 2011-2012 |
| Common bean | 68 | 13% | 3% |
| Cowpea | 24 | 0% | 4% |
| Groundnut | 63 | 2% | 8% |
| Soybean | 66 | 8% | 14% |

*Reasons for (non)-use*

The majority of farmers that used fertilizer, inoculants, pesticides and ‘other N2Africa techniques’ indicated that they did so because of higher yields. Saving labour seemed to be a valid reason only for the application of other N2Africa techniques, and was mentioned by fewer farmers than higher yields (Figure 4).

Looking at farmers who did not use certain technologies, the main reason mentioned by those farmers for not using fertilizer, inoculants and pesticides was the non-availability of these products. Also, fertilizer, and to a lesser extent inoculants and pesticides, were considered too expensive. Surprisingly, the main reason for not using other N2Africa techniques was that it requires too much labour, whereas labour savings also was an important reason for those that did make use of these techniques. In addition, there were few farmers that did not use techniques because they thought there would be no yield response.

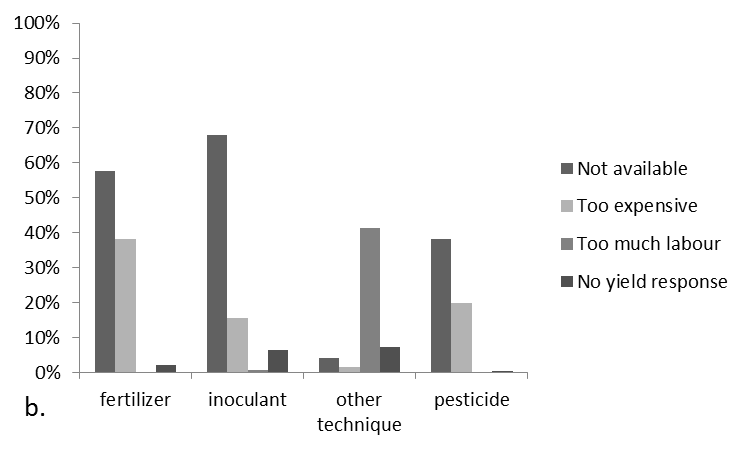
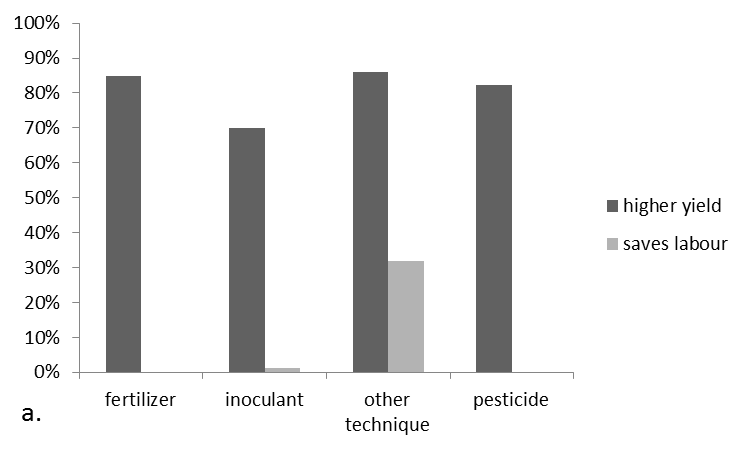


Figure 4. a) Reasons for using a specific technology, mentioned by % of using farmers and b) reasons for not using a specific technology mentioned by % of not-using farmers.

High yields seemed to be the most important reason for farmers to use a specific type of legume. Taste, market demand and grain quality were important to a smaller number of farmers. However, climbing bean and Bambara nut, although grown by few farmers, were very much valued for their taste (Table 19).

Table 23. Reasons for using a specific grain legume, mentioned by % of using farmers. Note: looking at the answers, the legume types could also refer to specific varieties and not to the crop in general. However, in the dataset they were put as legume type.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | n | Higher yield | Like grain quality | Better taste | Demand from markets | Better prices |
| Bambara nut | 7 | 43% | 0% | 71% | 29% | 0% |
| Common bean | 106 | 74% | 10% | 33% | 24% | 8% |
| Cowpea | 88 | 64% | 7% | 34% | 6% | 1% |
| Groundnut | 258 | 74% | 10% | 32% | 22% | 7% |
| Soybean | 58 | 76% | 10% | 17% | 10% | 3% |

Looking at reasons to use specific varieties of those legumes, we see that especially for all common bean and soybean varieties high yield was a very important reason (Figure 5). In contrast to the other crops, the soybean varieties were not particularly valued for their taste and grain quality. Of the common bean varieties, speckled ice was mostly valued for its grain quality and Pan 149 for its taste. Yet, high grain yield remained the most important reason to cultivate these varieties. Natal Common was by far the mostly grown groundnut variety, mostly because of its high yield, and to a lesser extent also for its grain quality and taste. The less grown variety Valencia was valued only for its high yield, whereas Kasawaira was grown mostly because its grain quality is liked by the farmers.

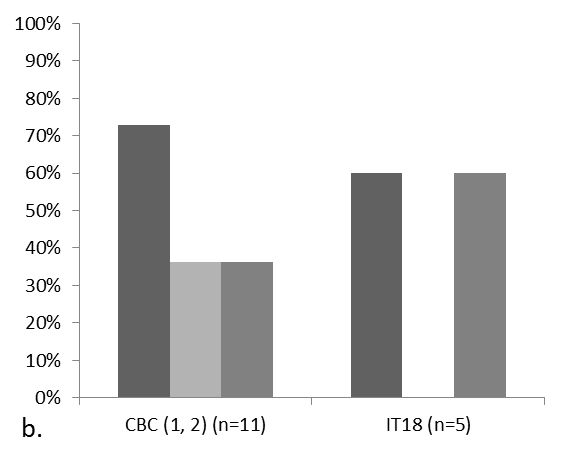
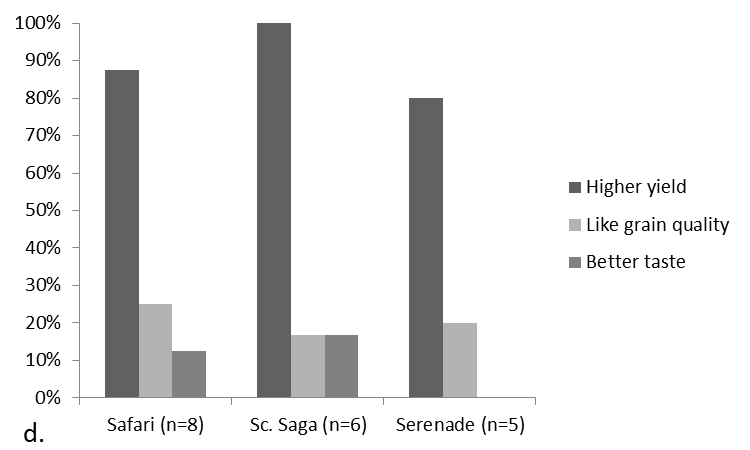
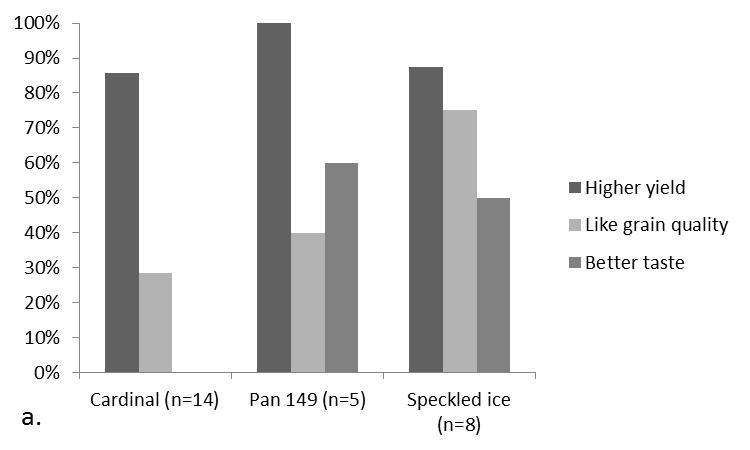
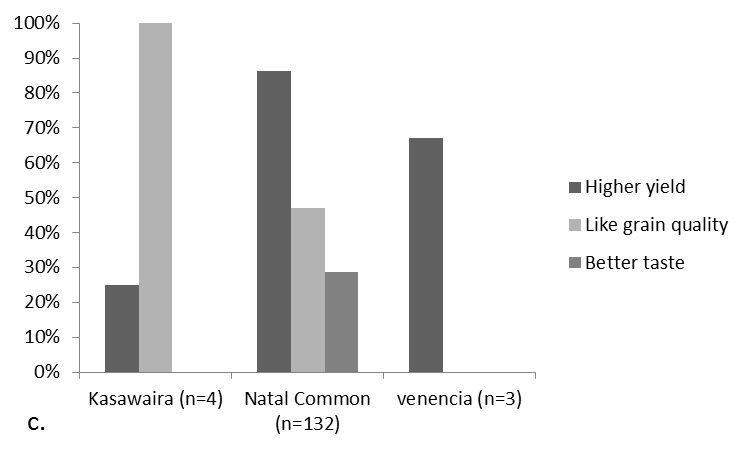


Figure 5. Reason for use of specific varieties of a) common bean, b) cowpea, c) groundnut and d) soybean. Varieties which were cultivated by less than three farmers were excluded from this overview.