**Overview agronomy trial results Kenya, long rains 2011**

***General comments***

The agronomy trials during the long rains in Kenya in 2011 consisted of:

* 1 bush beans input trial (variety: Kenya Umoja)
* 2 climbing beans input trials (variety: Kenya Tamu)
* 5 soybean input trials (variety: TGx1740-2F)
* 1 bush bean variety trial (blanket application of P and KCl)
* 1 climbing bean variety trial (blanket application of P and KCl)

Error bars in graphs represent standard error of means.

Bush bean yield (one input trial only) was positively affected by inoculation, and in combination with lime yields increased even further. Effects of inoculation on stover yields were less pronounced, but in combination with lime stover yields did increase significantly. Low germination rates were associated with the application of DAP[[1]](#footnote-1), although this did not impact yield and average grain yields were highest with this fertilizer. Other fertilizer inputs also enhanced grain yields compared to the control, but to a lesser extent. In the variety trial, bush bean germination was very low. Grain yields are still reasonable, however. The yields for varieties Tsimbindi, KK 8 and KK 071 increased with inoculation and were significantly higher than for varieties KK 15 and KK 072. The average number of nodules was not increased with inoculation, except for local variety Tsimbindi. Overall, KK varieties did not perform better than the local Tsimbindi variety.

As with bush beans, germination in climbing beans was lowest in the treatment with DAP, but grain and stover yields were highest. Sympal fertilizer also gave high grain yields. As variability within treatments was high, the evidence of the impact of fertilisers on grain yield was not strong. In the experiment in Bungoma, the highest grain yields were achieved with a combination of lime and inoculation. In Migori, however, this combination only improved grain yields for the treatments with DAP and Sympal. Also stover yields only showed a fair response to this combination. The variety trials showed large differences in grain and stover yields, with large standard errors. Inoculation tripled yields of Kenya Mavuno, and yields for Mac 9 and Umubano improved significantly as well. All other varieties did not respond to inoculation. Gasirida Kenya Tamu and Mac 44 gave the highest grain yields without inoculation. Stover yields were highest for Gasirida, Kenya Mavuno and Kenya Tamu.

In soybean trials, generally all fertilizer inputs increased grain yields compared to the control. Sympal fertilizer often showed good results, whereas application of rock P did not have pronounced effects. In the majority of treatments, input of lime also increased grain yields. The effect of inoculation only was limited (only the treatments with DAP showed some response). In combination with lime, however, yields often increased considerably. This combination also improved stover yields in most of the treatments, and so did fertilizer inputs. Thus, response to inoculation alone without lime additions was limited. Germination of soybean was not affected by any of the treatments. Inoculation alone did not improve the average number of nodules, but application of fertilizer or lime often did. The treatments with P+K and Sympal generally had the highest number of nodules.

***Bush bean input trial***

Location: Bungoma-Mabanga

GPS: NA

Planting date: 26-3-2011

Harvest date: 27-6-2011

Variety: Kenya Umoja

Remarks:

The treatments with DAP had a lower germination percentage than other treatments. They all had similar germination percentages. Lowest grain yields were found in the treatments without fertilizer. Also treatments with fertilizer but without lime and inoculation achieved low grain yields. On average, the highest yields were found in the treatments with DAP, which is in contrast to the low germination percentage. Inoculation had an effect on all treatments, and the most in combination with P+K and Sympal. Combination of lime and inoculation increased grain yields considerably compared to no lime and no inoculation. Adding inputs of super P or DAP even more than doubled bush bean yields compared to yields of the control treatment. Effects of inoculation on stover yields were less pronounced, but all treatments showed some effect (except for the treatment with DAP). The combination of lime and inoculation did have a significant impact on stover yield (again except for DAP).

*Germination percentage*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 89 | 80 | 79 | 72 | 86 | 79 | 82 | 81 |
| + inoc | 79 | 83 | 80 | 64 | 77 | 86 | 87 | 79 |
| With lime | - inoc | 84 | 83 | 84 | 72 | 83 | 79 | 86 | 82 |
| + inoc | 94 | 86 | 91 | 70 | 83 | 86 | 80 | 84 |
|  | Average | 86 | 83 | 84 | 69 | 82 | 82 | 84 | 82 |

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 725 | 967 | 1074 | 1306 | 974 | 968 | 977 | 999 |
| + inoc | 930 | 1220 | 1433 | 1598 | 1171 | 1221 | 1594 | 1310 |
| With lime | - inoc | 921 | 1286 | 1286 | 1704 | 1407 | 1172 | 1228 | 1286 |
| + inoc | 1152 | 1490 | 1379 | 1827 | 1609 | 1742 | 1263 | 1495 |
|  | Average | 932 | 1241 | 1293 | 1609 | 1291 | 1276 | 1266 | 1272 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 626 | 654 | 719 | 1042 | 734 | 679 | 674 | 733 |
| + inoc | 731 | 639 | 943 | 1134 | 823 | 835 | 961 | 867 |
| With lime | - inoc | 759 | 696 | 848 | 1077 | 804 | 720 | 769 | 810 |
| + inoc | 824 | 837 | 837 | 895 | 997 | 1101 | 826 | 902 |
|  | Average | 735 | 707 | 837 | 1037 | 840 | 834 | 808 | 828 |

***Climbing bean input trial***

Location: Migori – Nyanza

GPS: E034˚ 29' 04.9"; S01˚ 00' 42.6"; Elevation: 1529 m

Planting date: 4-4-2011

Harvest date: 26-7-2011

Variety: Kenya Tamu

Remarks:

Grain yields for the control are low, and significantly improved by all fertilizer inputs. Yields were nevertheless poor given the potential yield of these climbing bean varieties Differences in grain yields between fertilizers are small. Inoculation did not have a positive effect on grain yields in any of the treatments. Liming increased yields for the treatments with DAP and Sympal, although standard errors are large. Stover yields also increased as a result of fertilizer inputs, but to a lesser extent than grain yields. Inoculation and/or lime did not increase stover yields for most treatments with fertilizer, except for the two treatments with rock P.

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 690 | 1121 | 1200 | 1037 | 1124 | 969 | 1052 | 1028 |
| + inoc | 601 | 910 | 919 | 1058 | 1093 | 1148 | 1134 | 980 |
| With lime | - inoc | 768 | 948 | 858 | 1176 | 1082 | 1070 | 1369 | 1039 |
| + inoc | 630 | 790 | 1093 | 1158 | 983 | 972 | 1248 | 982 |
|  | Average | 672 | 942 | 1018 | 1107 | 1070 | 1040 | 1201 | 1007 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 1005 | 1410 | 1109 | 1038 | 1103 | 1125 | 1130 | 1132 |
| + inoc | 1119 | 977 | 1015 | 1101 | 1230 | 1148 | 1311 | 1128 |
| With lime | - inoc | 989 | 1067 | 981 | 1160 | 1365 | 1135 | 1503 | 1171 |
| + inoc | 718 | 848 | 1106 | 1363 | 1334 | 1197 | 1355 | 1132 |
|  | Average | 958 | 1075 | 1053 | 1165 | 1258 | 1151 | 1325 | 1141 |

***Climbing bean input trial***

Location: Bungoma-Mabanga

GPS: NA

Planting date: 26-3-2011

Harvest date: 13-7-2011

Variety: Kenya Tamu

Remarks:

The treatment with DAP had a reduced germination percentage, which was also found in the bush bean trial in same location. Other treatments showed comparable and reasonably high germination percentages. Grain yields on average were highest in treatments with lime and inoculation. Also inputs Sympal and DAP gave high grain yields (mainly because of high yields achieved by lime + inoculation). Without lime and inoculation, only the input of MRP-Pellets led to a significant increase in yield compared to the control. Inoculation only had a significant impact in combination with DAP and Sympal. The effect of inoculation on stover yield was not significant for any of the treatments. With a combination of lime and inoculation there was some improvement in stover yield, but the largest impact on stover yield was achieved by application of DAP.

*Germination percentage*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 91 | 93 | 91 | 63 | 82 | 81 | 90 | 84 |
| + inoc | 85 | 87 | 94 | 61 | 87 | 83 | 82 | 83 |
| With lime | - inoc | 85 | 91 | 83 | 72 | 88 | 89 | 86 | 85 |
| + inoc | 89 | 89 | 84 | 80 | 85 | 84 | 81 | 85 |
|  | Average | 88 | 90 | 88 | 69 | 85 | 84 | 85 | 84 |

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 1368 | 1580 | 1992 | 1543 | 1378 | 1786 | 1726 | 1625 |
| + inoc | 1305 | 1705 | 1847 | 1773 | 1936 | 1857 | 2077 | 1786 |
| With lime | - inoc | 1530 | 2123 | 1716 | 1790 | 2010 | 1889 | 1550 | 1801 |
| + inoc | 1507 | 1505 | 1958 | 2728 | 1821 | 1863 | 2597 | 1997 |
|  | Average | 1428 | 1728 | 1878 | 1958 | 1786 | 1849 | 1987 | 1802 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 749 | 824 | 1156 | 1135 | 904 | 1038 | 1070 | 982 |
| + inoc | 837 | 1022 | 905 | 951 | 1146 | 1216 | 1054 | 1019 |
| With lime | - inoc | 1092 | 1263 | 1167 | 1202 | 1111 | 1116 | 1053 | 1143 |
| + inoc | 868 | 981 | 1049 | 1548 | 1106 | 1015 | 1153 | 1103 |
|  | Average | 887 | 1023 | 1069 | 1209 | 1067 | 1096 | 1083 | 1062 |

***Soybean input trial***

Location: Butere-Manyala

GPS: NA

Planting date: 29-3-2011

Harvest date: 14-7-2011

Variety: TGx1740-2F

Remarks:

Germination in all treatments was indicated to be 100%. The highest average number of nodules per plant was found in the treatments with P+K and Sympal. Liming also increased the number of nodules, and generally had a larger effect than inoculation. All fertilizer inputs greatly improved nodulation compared to the control treatment without fertilizer (with or without inoculation). On average, grain yields highest for treatment with P+K; rock P did not give much increase compared to control. Treatments with inoculation and lime increased yields compared to no inoculation and no lime in all treatments except the one with MRP-Dust, which had a relatively high control yield. The effect of inoculation only, without lime, was limited. It only improved yields somewhat in the treatments with DAP and Sympal, but not significantly. The same is found for soybean stover yields. The combination of inoculation and lime greatly improved stover yields though. The treatment with DAP generally achieved the highest stover yields.

*Average number of nodules per plant*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 0.2 | 2.2 | 0.4 | 0.4 | 1.9 | 8.2 | 4.6 | 2.6 |
| + inoc | 0.1 | 2.0 | 2.5 | 2.9 | 3.6 | 2.3 | 5.3 | 2.7 |
| With lime | - inoc | 0.6 | 4.8 | 2.7 | 4.2 | 4.7 | 8.5 | 7.4 | 4.7 |
| + inoc | 0.7 | 1.6 | 3.1 | 2.2 | 6.6 | 10.5 | 7.7 | 4.6 |
|  | Average | 0.4 | 2.7 | 2.2 | 2.4 | 4.2 | 7.4 | 6.3 | 3.6 |

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 503 | 993 | 730 | 1085 | 1005 | 1255 | 1158 | 961 |
| + inoc | 505 | 879 | 709 | 1217 | 1056 | 1459 | 1121 | 992 |
| With lime | - inoc | 841 | 912 | 828 | 1479 | 1181 | 1648 | 1302 | 1170 |
| + inoc | 793 | 905 | 933 | 1114 | 1427 | 1715 | 1605 | 1213 |
|  | Average | 660 | 922 | 800 | 1224 | 1167 | 1519 | 1297 | 1084 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 1291 | 2319 | 1708 | 2874 | 2444 | 2836 | 2300 | 2253 |
| + inoc | 1068 | 1915 | 1612 | 3132 | 2545 | 2659 | 2418 | 2193 |
| With lime | - inoc | 1747 | 2291 | 2136 | 3981 | 2756 | 3102 | 2714 | 2675 |
| + inoc | 2039 | 2540 | 2091 | 3190 | 2967 | 3234 | 3351 | 2773 |
|  | Average | 1536 | 2266 | 1887 | 3294 | 2678 | 2958 | 2696 | 2474 |

***Soybean input trial***

Location: Migori

GPS: E034˚ 28' 06.2"; S01˚ 01' 24"; Elevation: 1463 m

Planting date: 2-4-2011

Harvest date: 28-7-2011

Variety: TGx1740-2F

Remarks:

There were no differences in germination between the treatments (all indicated to be 100%).

Yields are relatively low. Inoculation had no effect, neither in combination with lime. Only in the treatment with TSP, grain and stover yields increased with inoculation and lime. Generally, fertilizer inputs only slightly increased grain yields (largest effect from DAP, P+K and Sympal). The increase in stover yields with fertilizer is much more obvious, except for the treatments with rock P. Treatment effects appear to be overridden by other yield limiting factor(s) in this trial.

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 624 | 552 | 586 | 788 | 588 | 957 | 895 | 713 |
| + inoc | 620 | 607 | 535 | 818 | 729 | 780 | 594 | 669 |
| With lime | - inoc | 596 | 949 | 739 | 854 | 751 | 737 | 790 | 774 |
| + inoc | 426 | 425 | 457 | 657 | 697 | 587 | 561 | 544 |
|  | Average | 567 | 633 | 579 | 779 | 691 | 765 | 710 | 675 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 702 | 651 | 700 | 1102 | 726 | 1081 | 877 | 834 |
| + inoc | 585 | 758 | 638 | 1145 | 893 | 941 | 811 | 824 |
| With lime | - inoc | 432 | 683 | 656 | 990 | 749 | 818 | 775 | 729 |
| + inoc | 576 | 503 | 579 | 847 | 920 | 832 | 800 | 722 |
|  | Average | 574 | 649 | 643 | 1021 | 822 | 918 | 816 | 777 |

***Soybean input trial***

Location: Butula

GPS: E034˚ 16' 25.4"; N00˚ 19' 16.5"; Elevation: 1329 m

Planting date: 24-3-2011

Harvest date: 6-7-2011

Variety: TGx1740-2F

Remarks:

Germination is relatively low for all treatments. The treatment with DAP has the lowest germination percentage. Generally, average number of nodules per plant did not increase with inoculation only, but in combination with lime nodulation improved considerably. In the treatment with P+K, the average number of nodules was highest, whereas in the treatment with Sympal inoculation greatly enhanced nodulation as well. For grain yield, application of lime had a larger effect than inoculation. All fertilizer inputs increased grain yields (only for MRP-Pellets yields are similar), especially in combination with lime. Response to inoculation is limited in terms of stover yields, but in combination with lime yields improved for most treatments. Fertilizer inputs improved stover yields, apart from rock P.

*Germination percentage*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 69 | 51 | 67 | 56 | 57 | 51 | 57 | 58 |
| + inoc | 61 | 58 | 68 | 57 | 67 | 70 | 70 | 64 |
| With lime | - inoc | 72 | 66 | 61 | 59 | 63 | 71 | 71 | 66 |
| + inoc | 79 | 76 | 85 | 67 | 68 | 63 | 81 | 74 |
|  | Average | 70 | 63 | 70 | 60 | 64 | 64 | 70 | 66 |

*Average number of nodules per plant*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 11 | 12 | 28 | 3 | 14 | 17 | 3 | 13 |
| + inoc | 7 | 9 | 8 | 5 | 20 | 24 | 15 | 13 |
| With lime | - inoc | 28 | 17 | 16 | 14 | 16 | 16 | 9 | 17 |
| + inoc | 7 | 27 | 17 | 20 | 17 | 36 | 38 | 23 |
|  | Average | 13 | 16 | 17 | 11 | 17 | 23 | 16 | 16 |

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 520 | 1057 | 674 | 1150 | 946 | 821 | 1080 | 893 |
| + inoc | 798 | 1004 | 790 | 838 | 904 | 1192 | 1226 | 965 |
| With lime | - inoc | 1163 | 1138 | 995 | 1263 | 1314 | 1267 | 1417 | 1222 |
| + inoc | 757 | 1089 | 1033 | 1365 | 1368 | 1114 | 1353 | 1154 |
|  | Average | 810 | 1072 | 873 | 1154 | 1133 | 1098 | 1269 | 1058 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 874 | 1121 | 937 | 1480 | 1196 | 960 | 1038 | 1087 |
| + inoc | 925 | 1096 | 947 | 1088 | 1149 | 1333 | 1315 | 1122 |
| With lime | - inoc | 1212 | 1264 | 1141 | 1595 | 1454 | 1362 | 1543 | 1367 |
| + inoc | 1133 | 1294 | 1208 | 1709 | 1603 | 1278 | 1542 | 1395 |
|  | Average | 1036 | 1194 | 1058 | 1468 | 1351 | 1233 | 1360 | 1243 |

***Soybean input trial***

Location: Bungoma-Sang'alo Institute

GPS: E034˚ 35' 31.9"; N00˚ 31' 24.8"; Elevation: 1444 m

Planting date: 24-3-2011

Harvest date: 11-7-2011

Variety: TGx1740-2F

Remarks:

Germination is comparable for all treatments and reasonably high. The number of nodules per plant increased with inoculation in the treatments with DAP, super P and Sympal. The combination of inoculation and lime did not further increase for these treatments, but resulted in significantly higher number for the treatment without fertilizer, and with rock P. Grain yields are relatively low for the treatments without fertilizer, and all fertilizer types improved yields. The treatments with MRP-Dust and Sympal had the highest overall grain yields. Inoculation only significantly increased yields in the treatment with DAP. Addition of lime also showed mixed results. For stover yields, none of the treatments (fertilizer, inoculation or lime) significantly improved yields. Hence, fertilizer inputs mainly benefit grain yields and resulted in a higher harvest index.

*Germination percentage*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 86 | 94 | 89 | 86 | 86 | 87 | 92 | 86 |
| + inoc | 88 | 83 | 83 | 97 | 94 | 92 | 91 | 88 |
| With lime | - inoc | 89 | 98 | 89 | 100 | 94 | 98 | 98 | 89 |
| + inoc | 90 | 92 | 88 | 99 | 100 | 100 | 90 | 90 |
|  | Average | 86 | 94 | 89 | 86 | 86 | 87 | 92 | 86 |

*Average number of nodules per plant*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 0.7 | 2.1 | 0.3 | 0.2 | 0.8 | 3.0 | 0.9 | 0.7 |
| + inoc | 0.6 | 0.9 | 0.3 | 1.6 | 2.5 | 5.9 | 4.1 | 0.6 |
| With lime | - inoc | 0.7 | 1.8 | 3.1 | 3.4 | 0.9 | 9.2 | 3.5 | 0.7 |
| + inoc | 6.2 | 8.9 | 7.2 | 0.9 | 0.4 | 2.9 | 2.0 | 6.2 |
|  | Average | 0.7 | 2.1 | 0.3 | 0.2 | 0.8 | 3.0 | 0.9 | 0.7 |

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 715 | 1299 | 1022 | 927 | 1041 | 1031 | 1260 | 715 |
| + inoc | 692 | 1098 | 761 | 1452 | 1279 | 891 | 757 | 692 |
| With lime | - inoc | 849 | 841 | 1245 | 1064 | 998 | 1260 | 1099 | 849 |
| + inoc | 814 | 1299 | 893 | 1076 | 948 | 1059 | 1262 | 814 |
|  | Average | 715 | 1299 | 1022 | 927 | 1041 | 1031 | 1260 | 715 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 1432 | 1590 | 1635 | 1553 | 1682 | 1392 | 1578 | 1432 |
| + inoc | 841 | 1070 | 993 | 1796 | 1454 | 1016 | 942 | 841 |
| With lime | - inoc | 1273 | 1349 | 1609 | 1647 | 1261 | 1537 | 1586 | 1273 |
| + inoc | 1478 | 1688 | 1176 | 1687 | 1363 | 1332 | 1694 | 1478 |
|  | Average | 1432 | 1590 | 1635 | 1553 | 1682 | 1392 | 1578 | 1432 |

***Soybean input trial***

Location: Rarieda

GPS: E034˚ 23' 17.2"; S00˚ 08' 15.2"; Elevation: 1212 m

Planting date: 7-4-2011

Harvest date: 1-8-2011

Variety: TGx1740-2F

Remarks:

Grain yields were highest in the treatments with DAP and Sympal. None of the fertilizers significantly improved grain yields without inoculation however. With inoculation, grain yields are higher than the control with DAP, super P and Sympal. Inoculation had little effect on the control, and the treatments with rock P. With addition of lime even better results were achieved for both treatments with super P: yields (more than) doubled. Also the control treatment strongly responded to the combination of lime and inoculation. Stover yields of all treatments also increased as a result of inoculation, except for the control. With lime the response was even stronger, and also stover yields for the control increased with this treatment.

*Grain yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 493 | 675 | 637 | 1154 | 580 | 773 | 901 | 745 |
| + inoc | 606 | 954 | 858 | 1333 | 1025 | 999 | 1397 | 1025 |
| With lime | - inoc | 919 | 875 | 656 | 932 | 1029 | 898 | 941 | 893 |
| + inoc | 1015 | 897 | 807 | 1340 | 1378 | 1374 | 1315 | 1161 |
|  | Average | 758 | 850 | 740 | 1190 | 1003 | 1011 | 1138 | 956 |

*Stover yield*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | None | MRP-Dust | MRP-Pellets | DAP | TSP | TSP/KCl | SYMPAL | Average |
| Without lime | - inoc | 637 | 725 | 679 | 1084 | 652 | 858 | 1015 | 807 |
| + inoc | 733 | 1012 | 1006 | 1357 | 1062 | 895 | 1448 | 1073 |
| With lime | - inoc | 1057 | 928 | 693 | 774 | 1090 | 967 | 1059 | 938 |
| + inoc | 961 | 1049 | 1004 | 1219 | 1493 | 1349 | 1174 | 1178 |
|  | Average | 847 | 929 | 846 | 1108 | 1074 | 1017 | 1174 | 999 |

***Bush bean variety trial***

Location: Kakamega-Obadia Shipoche

GPS: E 034˚ 39' 58.8"; N00˚ 12' 46.7"; Elevation: 1487 m

Planting date: 17-3-2011

Harvest date: 16-6-2011

Remarks:

Germination on all plots was low, and especially the plots with inoculation had very low germination percentages. Variety KK071 has the highest average number of nodules, both with and without inoculation. Inoculation did not improve nodule number, except for the local variety Tsimbindi. Without inoculation, grain and stover yields between the varieties did not differ much. With inoculation yields for varieties Tsimbindi, KK 8 and KK 071 increased and therefore also improved significantly compared to varieties KK 15 and KK 072. Overall, KK varieties did not perform better than the local Tsimbindi variety.

*Germination percentage*

|  |  |  |
| --- | --- | --- |
| **Variety** | **- inoc** | **+ inoc** |
| Local check (Tsimbindi) | 61 | 46 |
| KK 8 | 70 | 37 |
| KK 15 | 50 | 65 |
| KK 071 | 57 | 47 |
| KK 072 | 64 | 59 |

***Climbing bean variety trial***

Location: Bungoma-Sang'alo

GPS: E034˚ 35' 31.9"; N00˚ 31' 24.8"; Elevation: 1444 m

Planting date: 24-3-2011

Harvest date: 12-7 and 23-7-2011

Remarks:

There are large differences between the climbing bean varieties, and without inoculation varieties Gasirida, Kenya Tamu and Mac44 and RWV 1129 show the highest grain and stover yields. Standard errors are large however. With inoculation, yields of Kenya Mavuno tripled, and for Mac 9 and Umubano grain yields improved significantly as well. All other varieties did not respond to inoculation, and hence these varieties, together with Gasirida and Kenya Tamu gave the highest grain yields with inoculation. Stover yields are highest for Gasirida, Kenya Mavuno and Kenya Tamu.

1. Low germination in the treatments with DAP can be caused by application too close to the seed, so that the seed and the fertilizer were in contact with one another. DAP may have had a stronger influence on germination than other fertilizers, which is found in other studies as well. [↑](#footnote-ref-1)