|  |
| --- |
| Table A.1. Combined analyses of variance for agronomic traits of two maize hybrids grown in pots with two fertilization treatments (acacia green manure vs. control) in experiment 1 (2017).  |
| **Response variable** | **Treatment (T)** | **Hybrid (H)** | **T × H** |
| Plant dw at V6 (g) | **0.009** | 0.371 | **0.019** |
| Vigor (1-9)b | 0.208 | 0.975 | 0.677 |
| Plant height at V6 (cm) | **0.016** | **0.000** | **0.034** |
| Plant height at flowering (cm) | **< 0.000** | **< 0.000** | 0.450 |
| Number of leaves at V6  | 1.000 | 0.792 | 0.880 |
| Number of leaves at flowering  | 0.471 | 0.683 | 0.736 |
| Basal fluorescence (Fo) at V6  | **0.001** | 0.705 | 0.951 |
| Efficiency of photosystem II (Fv/Fm) at V6  | **0.001** | 0.594 | 0.884 |
| Net photosynthetic rate at V6 (µmol CO2 m-2 s-1) | 0.440 | 0.052 | 0.166 |
| Net photosynthetic rate at flowering (µmol CO2 m-2 s-1) | 0.164 | 0.800 | 0.269 |
| Days to silking  | **0.011** | **< 0.000** | 0.552 |
| Days to anthesis | 0.339 | **0.002** | 0.862 |
| Anthesis – silking interval (ASI) (days) | **< 0.000** | **< 0.000** | 0.924 |
| Plant height (cm) | **0.014** | **< 0.000** | 0.223 |
| Ear height (cm) | 0.055 | **< 0.000** | 0.280 |
| Plant dw (g) | **< 0.000** | **< 0.000** | **0.002** |
| Ear dw (g) | **< 0.000** | 0.345 | **0.002** |
| The numbers correspond to *P* values from two-way Linear Models (Pr(>F)) or Generalized Linear Models (count variables, Pr(>Chi)). Values in bold indicate significance at *P* ≤ 0.05.a Vigor was estimated by using a scale from 1 = weak plant to 9 = vigorous plant.dw = dry weight. |

|  |
| --- |
| Table A.2. Analyses of variance for agronomic traits of two maize hybrids grown in pots with two fertilization treatments (acacia green manure vs. control) in 2017, when the Treatment × Hybrid interaction was significant (Table A.1).  |
| **Hybrid** | **Response variable** | **Treatment** |
| A619 × A632 (Field corn) | Plant dw at V6 (g) | **0.003** |
|  | Plant height at V6 (cm) | 0.709 |
|  | Plant dw (g) | **< 0.000** |
|  | Ear dw (g) | **< 0.000** |
| V679 × V576 (Sweet corn) | Plant dw at V6 (g) | - |
|  | Plant height at V6 (cm) | **< 0.000** |
|  | Plant dw (g) | **< 0.000** |
|  | Ear dw (g) | **< 0.000** |
| The numbers correspond to *P* values from two-way Linear Models (Pr(>F)). Values in bold indicate significance at *P* ≤ 0.05. We could not conduct the analysis for Plant dw at V6 for Sweet corn due to lack of data.dw = dry weight. |

|  |
| --- |
| Table A.3. Analyses of variance for soil nutrients after two maize hybrids were grown in pots with two fertilization treatments (acacia green manure vs. control) in experiment 1 (2017). |
| **Fixed effects** | **N (%)** | **C (%)** | **K (mg kg-1)** | **P (mg kg-1)** | **NO3-(mg kg-1)** |
| Treatment (T) | 0.471 | 0.177 | 0.930 | **0.005** | 0.338 |
| Hybrid (H) | 0.959 | **0.025** | 0.767 | 0.361 | **0.000** |
| T × H | 0.530 | 0.519 | 0.357 | 0.497 | 0.522 |
| The numbers correspond to *P* values from two-way Linear Models (Pr(>F)). Values in bold indicate significance at *P* ≤ 0.05. |

|  |
| --- |
| Table A.4. Analyses of variance for agronomic traits of maize grown in pots with four fertilization treatments (acacia green manure T6, T4 and T2a, and control) in experiment 2 (2018).  |
| **Response variable** | **Treatment**  |
| Vigor at V6 stage (1-9)b | 0.497 |
| Aspect at flowering (1-9)b | 0.559 |
| Plant height at V6 stage (cm) | 0.186 |
| Number of leaves at V6 stage | 0.814 |
| Number of leaves at flowering | 0.704 |
| Chlorophyll SPAD. at V6 stage | **0.033** |
| Chlorophyll SPAD. at flowering | **0.015** |
| Chlorophyll SPAD. before harvest | 0.792 |
| Basal fluorescence (Fo) at flowering | 0.394 |
| Efficiency of photosystem II (Fv/Fm) at flowering | 0.372 |
| Basal fluorescence (Fo) before harvest | 0.394 |
| Efficiency of photosystem II (Fv/Fm) before harvest | 0.809 |
| Photosynthetic rate at flowering (µmol CO2 m-2 s-1) | 0.893 |
| Days to silking | 0.455 |
| Days to anthesis | 0.782 |
| Anthesis – silking interval (ASI) (days) | 0.112 |
| Plant height (cm) | 0.310 |
| Ear height (cm) | 0.113 |
| Plant dw (g) | **0.031** |
| Ear dw (g) | 0.073 |
| Grains in ear (Yes/No) | 0.411 |
| Dry weight of grains (g) | 0.354 |
| Number of grains | **0.045** |
| Dry weight of 100K (g) | 0.278 |
| The numbers correspond to *P* values from one-way Linear Models (Pr(>F)) or Generalized Linear Models (count variables, Pr(>Chi)). Values in bold indicate significance at *P* ≤ 0.05.aT6, T4 and T2: acacia green manure incorporated into the soil six, four and two months before maize sowing.bVigor and aspect were estimated by using a scale from 1 = weak plant to 9 = vigorous plant |

|  |
| --- |
| Table A.5. Analyses of variance for soil nutrients after maize were grown in pots without maize (acacia green manure T0a and control T0) and soil from pots where maize was grown with four fertilization treatments (acacia green manure T6, T4 and T2b, and control) in experiment 2 (2018). |
| **Response variable** | **Treatment** |
| N | 0.713 |
| C | 0.616 |
| OM | 0.616 |
| NO2- (mg kg-1) | 0.321 |
| NO3-(mg kg-1) | 0.441 |
| NH4+ (mg kg-1) | **0.044** |
| The numbers correspond to *P* values from Linear Models (Pr(>F)). Values in bold indicate significance at *P* ≤ 0.05. OM = organic matter.aT0: soil at the beginning of the experiment with or without acacia green manure immediately incorporated, both without sowing maize.bT6, T4 and T2: acacia green manure incorporated into the soil six, four and two months before maize sowing. |

|  |
| --- |
| Table A.6. Combined analyses of variance for weeds grown in field maize plots with two fertilization treatments (acacia green manure incorporated into the soil four months before sowing vs. control) in two environments in experiment 3 (2019).  |
| **Response variable** | **Treatment (T)** | **Environment (E)** | **T × E** |
| Biomass of total weeds at T0 (g m-2)  | **0.039** | **0.021** | 0.666 |
| Biomass of monocotyledon weeds at T1 (g m-2) | 0.973 | - | - |
| Biomass of dicotyledon weeds at T1 (g m-2) | **0.014** | - | - |
| Biomass of *Cyperus* sp. at T1 (g m-2) | **0.001** | 0.723 | 0.749 |
| Biomass of total weeds at T1 (g m-2) | **0.006** | **< 0.000** | 0.126 |
| Number of monocotyledon weeds ant T1 (individuals m-2) | **< 0.000** | - | - |
| Number of dicotyledon weeds at T1 (individuals m-2) | **< 0.000** | - | - |
| Number of *Cyperus* sp. at T1 (individuals m-2) | **< 0.000** | **< 0.000** | **< 0.000** |
| Number total weeds at T1 (individuals m-2) | **< 0.000** | **< 0.000** | **< 0.000** |
| Biomass of monocotyledon weeds at T2 (g m-2) | **< 0.000** | 0.921 | **0.009** |
| Biomass of dicotyledon weeds at T2 (g m-2) | **0.029** | **0.027** | 0.130 |
| Biomass of total weeds at T2 (g m-2) | **< 0.000** | **0.016** | **< 0.000** |
| The numbers correspond to *P* values from two-way Linear Models (Pr(>F)) or Generalized Linear Models (count variables, Pr(>Chi)). Values in bold indicate significance at *P* ≤ 0.05. T0 = incorporation of acacia green manure to acacia plots four months before sowing maize. T1 = application of conventional fertilization to control plots and maize sowing. T2 = harvesting maize and end of the experiment. |

|  |
| --- |
| Table A.7. Analyses of variance for weeds grown in field maize plots with two fertilization treatments (acacia green manure incorporated into the soil four months before sowing vs*.* control) in two environments in experiment 3 (2019), when the Treatment × Environment interaction was significant (Table A.6). |
| **Sowing** | **Response variable** | **Treatment** |
| Early | Number of *Cyperus* sp. at T1 (individuals m-2) | **< 0.000** |
|  | Number total weeds at T1 (individuals m-2) | **< 0.000** |
|  | Biomass of monocotyledons weeds at T2 (g m-2) | **0.002** |
|  | Biomass of total weeds at T2 (g m-2) | **< 0.000** |
|  |  |  |
| Late | Number of *Cyperus* sp. at T1 (individuals m-2) | **< 0.000** |
|  | Number total weeds at T1 (individuals m-2) | **< 0.000** |
|  | Biomass of monocotyledons weeds at T2 (g m-2) | 0.409 |
|  | Biomass of total weeds at T2 (g m-2) | 0.238 |
| The numbers correspond to *P* values from one-way Linear Models (Pr(>F)) or Generalized Linear Models (count variables, Pr(>Chi)). Values in bold indicate significance at *P* ≤ 0.05. T1 = application of conventional fertilization to control plots and maize sowing. T2 = harvesting maize and end of experiment. |

|  |
| --- |
| Table A.8. Combined analyses of variance for two hybrids of maize grown in field plots with two fertilization treatments (acacia green manure incorporated into the soil four months before sowing vs. control) in two environments in experiment 3 (2019).  |
| **Fixed effects** | **Number of plants (sub-plot)** | **Total plant dw (kg)**  | **Ear dw (kg)** | **Stalk dw (kg)** | **Ear dw / total dw ratio** | **Number of ears (plot)** | **Grain dw (g)** | **100k dw** **(g)** |
| Treatment (T) | 0.934 | **0.042** | 0.064 | **0.045** | 0.056 | 0.392 | 0.092 | 0.431 |
| Environment (E) | 0.213 | **<0.000** | **<0.000** | **<0.000** | **<0.000** | **<0.000** | **<0.000** | **<0.000** |
| Hybrid (H) | 0.934 | 0.371 | 0.671 | 0.458 | 0.354 | 0.429 | 0.61 | 0.707 |
| E × T | 0.927 | 0.085 | 0.062 | 0.099 | **0.048** | 0.672 | 0.088 | 0.729 |
| H × T | 0.678 | 0.682 | 0.521 | 0.75 | 0.996 | 0.309 | 0.422 | 0.29 |
| E × H | 0.929 | 0.406 | 0.682 | 0.422 | 0.308 | 0.576 | 0.627 | 0.945 |
| E × T × H | 0.646 | 0.476 | 0.475 | 0.436 | 0.455 | 0.186 | 0.384 | 0.116 |
| The numbers correspond to *P* values from three-way Linear Models (Pr(>F)) or Generalized Linear Models (count variables, Pr(>Chi)). Values in bold indicate significance at *P* ≤ 0.05. dw = dry weight. |

|  |
| --- |
| Table A.9. Combined analyses of variance for two hybrids of maize grown in field plots with two fertilization treatments (acacia green manure incorporated into the soil four months before sowing vs. control) separated for each environment in experiment 3 (2019), when the Environment × Treatment interaction was significant (Table A.8). |
| **Environment** | **Fixed effects** | **Number of plants (sub-plot)** | **Total plant dw (kg)**  | **Ear dw (kg)** | **Stalk dw (kg)** | **Ear dw / total dw ratio** | **Number of ears (plot)** | **Grain dw (g)** | **100k dw** **(g)** |
| Early sowing | Treatment (T) | 0.901 | 0.436 | 0.786 | 0.398 | 0.597 | 1.000 | 0.654 | 0.820 |
|  | Hybrid (H) | 0.901 | 0.882 | 0.786 | 0.987 | 0.542 | 1.000 | 0.654 | 0.820 |
|  | T × H | 0.536 | 0.494 | 0.191 | 0.210 | 0.148 | 0.096 | 0.206 | 0.188 |
|  |  |  |  |  |  |  |  |  |  |
| Late sowing | Treatment (T) | 1.000 | 0.066 | 0.075 | 0.066 | **0.044** | 0.385 | 0.103 | **0.032** |
|  | Hybrid (H) | 1.000 | 0.386 | 0.680 | 0.386 | 0.345 | 0.385 | 0.623 | 0.525 |
|  | T × H | 1.000 | 0.571 | 0.504 | 0.571 | 0.703 | 0.975 | 0.411 | 0.271 |
| The numbers correspond to *P* values from two-way Linear Models (Pr(>F)) or Generalized Linear Models (count variables, Pr(>Chi)). Values in bold indicate significance at *P* ≤ 0.05.dw = dry weight. |

|  |
| --- |
| Table A.10. Analyses of variance for soil nutrients of filed plots where maize was grown with two fertilization treatments (acacia green manure incorporated into the soil four months before sowing vs. control) in two environments in experiment 3 (2019).  |
| **Response variable** | **Treatment (T)** | **Environment (E)** | **T × E** |
| N at T0 (%) | **0.023** | **< 0.000** | 0.473 |
| C at T0 (%) | **0.046** | **< 0.000** | 0.600 |
| NO2-at T0 (mg kg-1) | 0.570 | **0.001** | 0.207 |
| NO3-at T0 (mg kg-1) | **0.034** | **< 0.000** | **< 0.000** |
| NH4+ at T0 (mg kg-1) | 0.138 | **< 0.000** | 0.133 |
| N at T1 (%) | 0.226 | **< 0.000** | 0.837 |
| C at T1 (%) | 0.948 | **< 0.000** | 0.754 |
| NO2-at T1 (mg kg-1) | 0.919 | 0.0504 | 0.492 |
| NO3-at T1 (mg kg-1) | **0.000** | **0.022** | **0.036** |
| NH4+ at T1 (mg kg-1) | **0.006** | **0.014** | **0.016** |
| N at T2 (%) | 0.407 | **< 0.000** | 0.384 |
| C at T2 (%) | 0.392 | **< 0.000** | 0.906 |
| NO2-at T2 (mg kg-1) | **0.049** | **< 0.000** | 0.559 |
| NO3-at T2 (mg kg-1) | 0.052 | 0.330 | 0.460 |
| NH4+ at T2 (mg kg-1) | 0.393 | 0.235 | 0.825 |
| The numbers correspond to *P* values from two-way Linear Models (Pr(>F)). Values in bold indicate significance at *P* ≤ 0.05. T0 = incorporation of acacia material to acacia treatment four months before sowing maize. T1 = application of conventional fertilization to control treatment and maize sowing. T2 = harvesting maize and end of the experiment. |

|  |
| --- |
| Table A.11. Analyses of variance for soil nutrients of filed plots where maize was grown with two fertilization treatments (acacia green manure incorporated into the soil four months before sowing vs. control) separated for each environment in experiment 3 (2019), when the Treatment × Environment interaction was significant (Table A.10).  |
| **Environment** | **Response variable** | **Treatment** |
| Early sowing | NO3-at T0 (mg kg-1) | **< 0.000** |
|  | NO3-at T1 (mg kg-1) | **0.006** |
|  | NH4+ at T1 (mg kg-1) | **0.016** |
|  |  |  |
| Late sowing | NO3-at T0 (mg kg-1) | 0.123 |
|  | NO3-at T1 (mg kg-1) | **0.025** |
|  | NH4+ at T1 (mg kg-1) | 0.295 |
| The numbers correspond to *P* values from one-way Linear Models (Pr(>F)). Values in bold indicate significance at *P* ≤ 0.05. T0 = incorporation of acacia material to acacia treatment six months before sowing maize. T1 = application of conventional fertilization to control treatment and maize sowing.  |