# **Cluster of Activities Report Template**

**Cluster annual report - 2019**

**FP3 CoA 3.2 Cropping Systems Management**

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# MAIN ACHIEVEMENTS

This section provides a synthesis of main progress and achievements in implementing the annual Plan of Work. Fill this section considering the content of the GLDC POWB 2019 (<http://crp-gldc.icrisat.org/GLDC_POWB-Final.pdf> ). In particular, review the list Outputs (Annex 1) and complete the missing information in MEL. Output related information is essential to inform indicators on Number of innovation and Milestones achievement.

Use the sections below to highlight key findings with gender, youth, capacity development and climate change relevance.

**Crop production Systems**

* In Mozambique, 32 soybean varieties from private and public sources across Africa were evaluated in two agro-ecologies in collaboration with the Soybean Innovation Lab (SIL) to identify best performing varieties for release and integration into cropping systems. Yields for the top eight yielding varieties ranged from 4.0 – 5.8 tons ha-1 and the best yielding varieties also had the largest seed sizes (15.2 to 25.9 g 100-1 seed weight), trait which is becoming increasing attractive to farmers (Report to be uploaded)
* In a maize-cowpea intercrop system in Mozambique, cowpea yield for 2:1 maize-cowpea planting pattern was two times that for the 1:1 ratio. Furthermore, application of 30 kg N/ha to the 1:1 maize-cowpea system did not increase cowpea yield but yield almost doubled when 30 kg N/ha was applied to the 2:1 maize-cowpea system (0.82 vs 1.5 tons ha-1)
* In Mozambique 236 **s**oybean demonstration plots on varieties and inputs were established on farmers’ fields; a total area of 13.9 ha and 36% of the host farmers were women. No significant differences in yields were observed between male and female farmers when averaged across farmers and disaggregated by gender.
* In a multi-location field trial to evaluate five promising indigenous *Bradyrhizobium* strains on soybean in Mozambique, indigenous strain Moz 4 resulted in the highest nodulation and above ground biomass production with non-promiscuous soybean variety Safari compared to the commercial check, whereas indigenous strain Moz 61 inoculated on promiscuous soybean varieties Zamboane produced the best grain yield relative to the exogenous strains.
* In Malawi, optimal radiation use efficiency measured by leaf area index is achieved by maintaining full population of groundnut and intercropping it with pigeon pea at 75% of its recommended population. The maximum leaf area index is achieved around 100 days after planting. Similarly, growing groundnut of medium maturity (120 days) in intercrops with early maturing pigeon pea maturity (150 days) resulted in 44% more water use efficiency compared with groundnut sole cropping.
* Best fit groundnut and pigeon pea varieties for intercropping have been identified as intervention strategies to optimize yield for both crops and improve economic returns for the lowest risk to smallholder farmers. Demonstration plots were established around these ‘optimal’ doubled up legume systems that acted as study plots to train 98 master trainers of which 28 were women in three main agro-ecologies of Malawi.
* 110,000 are benefitting from the doubled up legume systems in 8 extension planning areas located in 7 districts in Malawi
* Focus Group Discussion participants indicated that food security, household income, nutrition security, adaptation to agro-ecological conditions and easy access to seed were the main reasons for preferring groundnut over of pigeon pea, sorghum and finger millet.
* Extension circular has been developed to guide extension workers working directly with farmers on the implementation of doubled up legume systems in Malawi
* In Burkina Faso, studies is on-going to identify agro-ecological options to optimize interactions between plants through intercropping of sorghum with native evergreen woody shrubs and a poster on impact of the density of shrub on sorghum yield was presented at 4th World Congress on Agroforestry in Montpellier in May 2019. <https://mel.cgiar.org/reporting/report/id/6937/del_id/17517>
* The study has identified a list of service plants mainly legumes that will be evaluated for adaptation to the Sahel conditions in terms of quantity and quality of biomass production. Farmer participatory testing of sorghum intercropping systems with grain and forage legumes are on-going in Burkina Faso. <https://mel.cgiar.org/reporting/report/id/6936/del_id/14905>
* In Uganda, the effectiveness of AMF inoculation on striga infection and yield of sole-cropped maize and maize-bean intercrops was conducted on 10 farmer’s fields. Results show that AMF inoculation decreases striga emergence. Data on bean nodulation, bean and maize grain yields, total biomass and other variables have been collected and are being analyzed.

**Decision support tools**

* Surveys have been completed for farm-household livelihood typologies, innovation adoptions, impacts of legume-based technological interventions on smallholder production and livelihood performance in Burkina Faso and Ethiopia.
* Data Envelopment Analysis Programming (DEAP) modelfor assessing technical efficiencies of crop production in Burkina Faso is being finalized and that in Ethiopia is on-going
* Agent-based modelof community-landscape dynamics driven from interactive household-farms for ex-ante assessments of impacts driven by legume-based interventions in Burkina Faso: Model specification and data collection are completed and empirical parameterization on going. Interventions considered include improved seeds and cereal-legume intercropping in combining with scenarios of socio-economic drivers (market prices, rural credits).
* Oral presentation given at the conference of International Society of Ecological Modelling (ISEM) in 2019
* Nutrient flow modelling to quantify macro nutrient (N, P, K) flows for average farming systems of different agricultural livelihoods systems types in Burkina Faso
* Resource criticality assessment to assess the depletion time of soil nutrient stock; and reliance of household-farm on own nutrient resources, reflecting inversely supply risk
* A “map” base for guiding stakeholders’ development of options for farm designs to improve nutrient stocks and effective cycles is being developed
* Ex-ante evaluations of farm design options is on-going

# Outcome cases and policy influenced (proposed)

Revise and complete the suggested list of outcome cases and policies to be documented

|  |  |  |
| --- | --- | --- |
| **Title of Outcome/ Impact Case Report (OICR) (30 words)** | **Description**  **(up to 80 words)** | **Geographic scope**  **(Specify if regional, national, sub-national and provide list of regions/countries)** |
| Not Applicable |  |  |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Name and description of policies modified in design**  **or implementation, informed by CGIAR research (20-50 words, ideally around 30 words)** | **Type**  **(policies/ strategies / laws/ regulations/ budgets/ investments/ curricula)** | **Whose policy is this?**  **The primary organization(s) either designing/promulgating the policy, law, investment (e.g. national government) etc. and/or within which it is operating.** | **Geographic scope**  **(Specify if regional, national, sub-national and provide list of regions/countries)** |
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|  |  |  |  |

# MAIN ACHIEVEMENTS WITH GENDER RELEVANCE

When possible, make reference to outputs reported, milestones completed, outcome cases or policy influence reported

The activities conducted have relevance specific to gender.

* Intercropping and rotation systems increase diversity of crops with legumes as a component of the system which increases food sources and improves food security and nutritional quality that are very important to women.
* In smallholder production systems, women are less likely to buy fertilizers due to affordability so the inclusion of legumes which fix atmospheric nitrogen into the cropping systems reduces fertilizer N requirement on farms and assist women to increase productivity
* Pigeon pea biomass is a good source of fuelwood saving a lot of time spent by women searching for firewood.
* Farm-household livelihood surveys integrated gender-responsive information that creates an operational basis for integrating gendered research
* Major efforts were made to increase women participation in project activities by conducting special female targeted training sessions in legume nutrition; conducting activities at times suitable for women. Female farmers and female farmers’ groups were supported with limited quantities of seeds and inputs such as P fertilizer and inoculant to host demonstration plots to enhance awareness about new varieties, cropping systems and other technologies in their communities. In 2019, 2301 farmers (48% female) were trained in Mozambique.

# MAIN ACHIEVEMENTS WITH Youth RELEVANCE

When possible, make reference to innovations reported, milestones completed, outcome cases or policy influence reported

The activities have no specific relevance to youth. They are applicable to all.

# MAIN ACHIEVEMENTS WITH CAPACITY DEVELOPMENT RELEVANCE

When possible, make reference to innovations reported, milestones completed, outcome cases or policy influence reported

* PhD Student Marguerite Mukangango graduated from Swedish University of Agricultural Sciences (SLU); defended Thesis on 27 June and Sept 2019: Title: Potential of *Acacia angustissima*, *Leucaena pallida* and *Mimos scabrella* in agroforestry systems on a Rwandan Ferralsols <https://pub.epsilon.slu.se/16153/7/mukangango_m_190517.pdf>
* Mukangango M, Nduwamungu J, Naramabuye FX, Nyberg G, Dahlin AS. 2019 Biomass production and nutrient content of three agroforestry tree species growing on an acid Anthropic Ferralsol under recurrent harvesting at different cutting heights. Agroforestry Systems. <https://doi.org/10.1007/s10457-019-00455-8>
* PhD student Tarirai Muoni graduated from Swedish University of Agricultural Sciences (SLU); defended Thesis on 24 September 2019: Title: Integrating legumes in mixed crop-livestock systems in east Africa: Farmers’ perceptions, ecosystem services and decision. <https://pub.epsilon.slu.se/16308/7/muoni_t_190903.pdf>
* Muoni, T., Barnes, A.P., Öborn, I., Watson, C.A, Bergkvist, G., Shiluli, M., Duncan, A.J. 2019. Farmer perceptions of legumes and their functions in smallholder farming systems in east Africa. International Journal of Agricultural Sustainability 17:3, 205-218, DOI: [10.1080/14735903.2019.1609166](https://doi.org/10.1080/14735903.2019.1609166)
* Muoni, T., Komsson, E., Öborn, I., Marohn, C., Watson CA, Bergkvist G, Barnes A, Cadish G, Duncan A. 2019. Reducing soil erosion in smallholder farming systems in east Africa through the introduction of different crop types. Experimental Agriculture <https://doi.org/10.1017/S0014479719000280>
* MSc student at Makerere University: Thesis: Evaluation of maize inoculation with arbuscular mycorrhizal fungi as a striga control method. Expect Thesis defense in April 2020
* MSc student at Makerere University preparing for Thesis defense. Title: Occurrence of fall armyworm and its natural enemies as influenced by cropping systems and soil fertility management practices in eastern Uganda.
* Training sessions organized for farmers, extension agents and other project partners across countries. The training focused on improved agronomy including rotation sequences, cropping patterns in intercrops, variety selection, appropriate planting time, row spacing and plant population, fertilizer and inoculant application, integrated pest and disease management, aflatoxin management in groundnut and post-harvest management of legumes. 2,500 farmers and extension agents (46% women) were trained in Mozambique and Malawi in 2019
* 13 final year students(7 males; 6 females) from local Universities in Mozambique were trained in a 6-month internship program from January to July 2019.

# MAIN ACHIEVEMENTS WITH CLIMATE CHANGE RELEVANCE

When possible, make reference to innovations reported, milestones completed, outcome cases or policy influence reported

* Drought and disease tolerant soybean, cowpea, groundnut and pigeon pea varieties have been selected and are being promoted for integration into the cropping systems
* Water management practices that minimize soil moisture loss such as soil cover at all times, water harvesting, appropriate planting time and optimum plant population are being promoted to enhance water use efficiency

# MAIN GAPS AND CHALLENGES

Describe the main challenges/bottlenecks encountered and the deviation from your annual plan of work.

Please list any relevant review or study on foresight, monitoring and evaluation that has been realized in the last 12 months at the project/cluster level and that has potentially not been implemented under cluster 1-4: Enabling environments and scaling to accelerate impact (Use Annex 2 to provide this list). Provide results from these evaluations and learning processes, if any.

* No deviations from the annual work plans

# MEASURES TAKEN AND ADJUSTMENTS PROPOSED

Describe action taken to address challenges/bottlenecks

Provide an update on your theory of change if this is part of the adjustments proposed

* Not applicable

# PARTNESHIPS: ACHIEVEMENT AND CHALLENGES

Please list up to three important partnerships for 2018, using the following table.

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| --- | --- | --- |
| **Brief description of partnership aims (30 words)** | **List of key partners in partnership (one or more partners). Do not use acronyms.** | **Main area of partnership (may choose multiple),**  **Research/Delivery/Policy/Capacity Development/Other, please specify** |
| No New partnership in 2019 |  |  |
|  |  |  |
|  |  |  |

Please include collaborations with one or more CRPs or Platforms – or in some cases with other Centers, if these are not already core partners for your CRP.

|  |  |  |
| --- | --- | --- |
| **Name(s) of collaborating CRP(s), Platform(s) or Center(s)** | **Brief description of the collaboration** | **Optional: Value added, in a few words** e.g. scientific or efficiency benefits |
| CRP Maize | Collaboration on Sustainable Intensification options and Cropping Systems including identifying appropriate legumes to diversify cereal-based systems | Leveraging on each other to effectively reach more farmers |

# FUND RAISING

Give a narrative summary on the financial status and health of the cluster (all windows).

Provide an update on fund raising efforts.