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WORKING DOCUMENT

CRP on Grain Legumes Extension Proposal:
Response to Comments

Submitted by:
CRP on Grain Legumes
The CRP Grain Legumes welcomes the response from the Consortium Office and the Independent Science and Partnership Council to its Extension Proposal. In general the comments are insightful and point to developments and activities that we recognize as necessary for the effective implementation of the program, some comments relate to clarification of matters where insufficient information had been provided in the proposal document; in part this reflects space limitation which the proposal exceeded.

Below we detail our response to the comments.
ISPC commentary on the extension proposal for CRP Grain Legumes 2015-16

Grain legumes are important commodities for food security, nutrition and income and can contribute to the sustainable intensification of farming systems. They are an important component of the CGIAR’s research portfolio. The ISPC provided a qualified endorsement of the revision of the original Grain Legumes (GL) proposal in February 2012 and the program only effectively got under way in August of 2012. Research progress has therefore been incremental, but the program reports successes in genomics and enhancements in organization of the program and partnerships.

We agree with these comments.

The ISPC identified the following points as areas where improvements could be made. These are highlighted below and elaborated on in the detailed commentary:

1. Specify a vision of success with respect to expected impact
   ..., vis-a-vis the number of targeted smallholder farmers and the farming systems in each country and region. Map target domains clearly for each of the grain legumes and the hypothesized impact pathways outlined. References to data and methods on which targets and projections are made should be made available at the time of submission of new proposals in response to the second call.

Our vision of success and much detail relating to the project was provided in the project description document dated August 2012 (http://1drv.ms/1gNUKvB) to which the extension proposal referred. We took the view that the extension proposal was required to explain our strategy for 2015 and 2016 and justify these proposals, given the original project proposal and description. The vision and justification is set out in this document on pp 5-7. The tables in that document drew on an economic analysis by Doug White and this is relevant to the restructuring of the program.

A research prioritisation by country was undertaken that related to the ‘Strategic Components’ that had been identified. The restructuring into Flagship projects follows that analysis with ‘SC2’ split into crop management, genetics, and breeding which correspond to FP1, FP2, and FP3 respectively.

Put simply our vision of success is to grow legume production as a component of agricultural systems and their consumption as a component of diet. An aspirational target would be 20% of agricultural area growing legumes and 20% of the diet with the associated direct and indirect benefits for income, diet and health. However, such simplistic figures require detailed deconvolution by region, household, individual and socioeconomic factors, farm size, wealth, urban vs rural etc. This simplistic direction of travel also needs to take account of the stability, time dependence and resilience of production as well as the multifunctional uses of legumes, such as the use of haulm for animal feed. The latter can be an important constraint: breeding for harvest index has driven much agricultural improvement in the developed world, but this is not necessarily appropriate in all target areas for Grain Legumes.

2. Undertake a rigorous demand analyses
   ... (to substantiate the claims made about increasing consumption), synthesize studies on adoption constraint analyses, and complete the priority setting exercise - by crop and region - based on need and impact potential.

The demand analysis referred to in (1) above formed the basis of the priority setting for the second half of 2012 and 2013. The actions initiated need to be brought to fruition yet we recognise that this is an on-going concern of the Grain Legumes and critical for the formulation of plans in the second phase. This is reflected in FP6 Knowledge, Impacts, Priorities, and Gender Organisation (formerly CC1). Adoption rate analyses have been undertaken and are available at http://1drv.ms/VIbp9H. These studies are also part of the (BMGF W3 funded) Tropical Legumes project, currently under independent review.
Overall estimates of demand vs supply in LIFD countries suggests that demand is rising, but demand per capita is falling. Moreover the demand in these countries is not met by their (combined) production\(^1\) (see figure). The balance between input and output markets for both seed and grain appears to influence demand and supply dynamics; price is a critical factor in this relationship. Reduced price would, for example, lead to increased demand for both seed and grain ramping up both productivity and demand for legume products. Whether a reduced price could sustain LIFDC production even with increased productivity may vary by location and understanding this in detail is important for our geographical focus for productivity improvement. However, we know, for example, that chickpea productivity in Ethiopia is comparable with that in Canada (the major exporter), so it is possible that productivity can be raised without overburdening farmers with input costs. An impact study conducted in Malawi in 2013 shows an increasing consumption of groundnuts from 1.5kg/capita in 1990 to 4.7kg/capita in 2007 (A summary of the report is available at: http://1drv.ms/1qgq5se)

3. The theory of change (ToC) for each target output
... should be completed as a matter of priority, and to include in each impact pathway the assumptions underlying progress along the pathway consistent with the assumptions underlying the overarching ToC.

In the extension proposal we highlighted this as an ongoing activity, so we agree with this comment. We see this as a way of connecting our monitoring and evaluation processes with our intended impacts. While the ToC per output target is very detailed (the CO requested this summarised per FP rather than OT) we see it as important to understand this fine level of detail for project monitoring and finding common measures per OT can help in identifying critical metrics. In the extension phase of two years we are conscious that we need to monitor progress towards our intended outcomes, but at this timescale the majority of our activities and outputs within the project cannot have time to achieve outcomes - seed multiplication rates alone would not permit this.

4. Proper targeting and definition of the breeding strategy
... requires a more nuanced definition that takes into account both agro-ecological and socioeconomic conditions, including the market preferred traits, demand patterns and the role of private and public sector in legume R & D.

We agree that ‘targeting and definition of the breeding’ requires a nuanced definition of the targets. In part this is what we mean with respect to IMOD discussed below. Breeding usually aims to increase productivity either as quantity or quality. Such improvement may come at a cost to the farmer in terms of more investment in time and or inputs, yet the consequence of improved productivity may be a reduction in unit value (e.g. the price per tonne may decline if the total supply increases). If the benefit of breeding is to accrue to the farmer, then these issues need to be considered with respect to priority setting and the trade-off between IDOs. Furthermore the gender dimension of improved productivity may tend to intensify the commodification of grain legumes and

\(^1\) Nedumaran, S., Abinaya, P., Shraavya, B., Rao, P. P. and Bantilan, M C S (2013) Grain Legumes Production, Consumption and Trade Trends in Developing Countries -An Assessment and Synthesis. RP-MIP Socio Economic Discussion papers, ICRISAT, Patancheru http://oar.icrisat.org/6428/
this may remove them from, or diminish the control over them, that is exerted by women. This has the potential for negative impact on equitable improvement of income and for nutrition. This indeed requires a nuanced view, and the trade-offs need to be considered and modelled as is intended within CC1.

We disagree that this impacts the breeding strategy as opposed to the breeding objectives.

5. **Pursue a more holistic, multi-disciplinary approach**

... to improving productivity and exploiting the potential for grain legumes in small-holder farming systems, both for their income potential and for improving the diets of the poor. Productivity enhancement, targeting, gender, market development and impact-at-scale on the farmers’ fields all need further improvement.

This clearly states the purpose of the CRP Grain Legumes. Indeed all FPs are have been designed to involve multiple partners along the diverse legume commodity value chains supported by this CRP.

6. **Clearly show linkages to other CRPs**

... through a table or a matrix. Attribution and transparency are critical where different CRPs contribute to different activities in the same value chain. The CRP should also consider explicitly defining a ‘partnership strategy’.

These linkages were described in the initial project proposal and were summarised in the section on CRP-CRP and related interactions, but were not tabulated.

The CRP-CRP linkages are described briefly in Annex 1 below and in the table.

We agree that these, together with W3/bilateral project contributions, need to be more clearly defined at the level of output targets, and this is ongoing. The partnership strategy also needs to be more clearly defined, however we need to recognise that most of the work within the CRP is from W3 or Bilateral projects which have donor recognised (or even specified) partnerships. The relationship between the CRP and these activities demands that such a strategy is both clarified and remains flexible.

### CRP evolution

The Grain Legume (GL) CRP has been funded for almost two years and shows some positive developments: program structure and strategy refined (5 IDOs and 5 FPs and 3 CC areas established) with emphasis on an Inclusive Market-Oriented Development (IMOD) approach; gender being well integrated into the program, establishment of a wide range of partnerships; and delivery of research outputs (e.g., sequencing of chickpea and groundnut) and some key outcomes. A Director was appointed in 2013 and some changes have been made in governance and structure. New instruments are or soon will be in place, e.g., student and grant schemes, and key programmatic achievements have resulted. The program is to be commended for accomplishing all this. As with many other CRPs, it is disappointing not to see a reporting of more scientific publications in either the Annual Report or the extension proposal.

We welcome these comments, and note the need for better reporting of our research publications in the Annual Report, where they are simply enumerated in Annex 1. We also welcome the comments from the Elsevier ‘Research Performance of CGIAR Research Programs’ which seems less critical of Grain Legumes, nevertheless this report seems to underestimate the scientific effort in Grain Legumes, and without access to the underlying data it is probably unwise to overemphasise the positive view detailed in that independent report.
From a programmatic perspective, there is concern about the heavy germplasm focus in this CRP and the lack of a more holistic and multi-disciplinary approach to improving productivity and exploiting the income-generating potential of grain legumes in small-holder farming systems and for improving the diets of the poor. Legumes are largely pro-poor and pro-women, eco-friendly and high value crops compared to many other crops. The global market demand is fast growing (e.g., in Asia), opening new markets for smallholder producers in Africa. But this potential remains under-utilized. The productivity enhancement (agronomy, crop management), targeting, gender, market development and impact-at-scale on the farmers’ fields all need further improvement. This may require complementary investments from governments and prioritization of legumes into national agricultural development, food security, nutrition and export strategies. GL cannot achieve its goal by working on germplasm development without addressing these challenges and working on some of these important issues to strengthen extension, seed and input delivery, postharvest management and marketing of grain legumes.

The ‘concern’ is not made explicit and we recognise that breeding alone will not be sufficient for Grain Legumes to deliver its promise. We do not consider breeding as a ‘germplasm focus’ though clearly we need to identify beneficial alleles in order for them to be deployed, and these require a source which can only be from germplasm resources, mutant populations or transgenics. All three are components of the redesigned FP2. FP1, FP3, FP4 FP5, Fp5 and FP6 (called CC1 and CC2 in the original version of the extension proposal) are all involved in activities that do not have a ‘germplasm focus’. Note that FP3 concerns the deployment of genetic resources identified in FP2. We do not consider the extent of our germplasm focus as either ‘heavy’ or inappropriate.

We agree that improving productivity can be through means other than breeding (Integrated Pest Management, improved N fixation, mechanisation and new crop rotations are each Product Lines in the Program). Furthermore genetic analysis does not improve productivity, but can contribute to it in a multidisciplinary approach. We further recognise that productivity increases per se are not sufficient unless they take account of other market and social issues (as discussed above). Exploiting the income-generating potential of grain legumes in small-holder farming systems and their role in improving the diets of the (urban and rural) poor are explicit objectives.

We agree that ‘impact at scale’ can grow and that Grain Legumes alone cannot achieve these desired outcomes. Our partnerships, such as that with EIAR, are essential for the achievement of these goals. In CRP target countries such as Tanzania, Uganda, Mozambique and Malawi as well as in non-target countries such as Zambia, the programme is leveraging other investments to scaling out of legume technologies that are integrated with their productivity enhancing technologies and policy options notably through USAID feed the future investments.

The extension proposal or Annual Report does not adequately specify a vision of success with respect to expected impact, vis-a-vis the number of targeted smallholder farmers and the farming systems in each country and region.

We accept this but these are specified in other documents such as the project description, POWB and the IDO document.

Target domains should be mapped and developed clearly for each of the grain legumes and the hypothesized impact pathways outlined.

This is properly part of the POWB.

In the proposal document (http://1drv.ms/1gNUKVb) consideration was given to a wide range of grain legume crops, the regions in which they grow, their constraints and the potential productivity

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2 If ‘germplasm focus refers to attention to anything with a genetic constitution, then necessarily anything to do with crops has a ‘germplasm focus’. Here we have assumed that the term refers to the analysis of stocks curated formally in germplasm collections.
gain that could be achieved by alleviating those constraints (considering estimates of likely adoption rates). This analysis led to the selection of target crops, areas and identified the Product Lines. See Appendix 5. Relative importance and yield losses (%) due to abiotic and biotic stresses in grain legumes in different regions p 149.

How would GL further refine this through proper modelling of farming systems and target domains? The targeting strategy needs to differentiate areas with good and poor market access in both high and low potential production environments. This is important for scaling promising innovations. This concern is related to a set of strategic issues identified by the ISPC in the first set of reviews of the original GL proposal.

We agree with these comments, for example in PL6 ‘Exploiting extra early maturity’ we require the integration of geophysical and climatological data with cropping systems information as well as good crop modelling to define potential locations for the uptake of extra early varieties.

PABRA will be initiating a new phase next year, with a greater emphasis on markets. Conceptually this will be organized around production-to-market corridors. For example, Tanzania has several important production zones and beans flow to the north, to the north-west, and to the south-west; and from Uganda to Nairobi (see Figure right). These market channels define who has market access. Relevant data is available at the level of specific varieties moving from one country to another.

The process of refining development domains to target investments in groundnut technologies is also underway in southern Africa. The target development domains have been identified from analysis of land productivity potential, access to markets, and population, to identify potential areas to be targeted for improved genotypes of groundnuts and production systems. See figure for example of the different development domains.

A summary of the preliminary research investment domains generated from biophysical data and socioeconomic data generated 5 domains for Malawi, i.e;

1. Domain 1. HHHH (High access to market, High land productivity potential, High rainfall (2129 mm), and High population density). These areas are suitable for a mixed cropping system due to land pressure and therefore suitable for doubled-up legume production options.

2. Domain 2. HLMH (High access to market, Low land productivity potential, Medium rainfall (1143mm), and High population density). Thyolo District falls in this category with investment in stress tolerant material is worthwhile.

3. Domain 3: LMMM (Limited access to Market, Medium land Productivity potential Medium rainfall and, Medium population Density). These areas received 852 mm to 982mm of rainfall relatively moderate population density compared to domain one giving some room for farm expansion and extensive groundnut production. Examples include Machinga and Nsanje

4. Domain 4: HMML (High access to markets, Medium land productivity potential, Medium rainfall, and low population density). These are areas such as Mwanza district close to Blantyre Malawi’s largest commercial city. Due to relatively lower precipitation received (671mm), drought tolerance is a must have for crop varieties
5. Domain 5: HMLL (High access to markets, Medium land productivity potential, low rainfall, and low population density). Kasungu and Chikwawa districts falls in this category. Both districts are close to the two largest cities in Malawi, Lilongwe and Blantyre respectively. These areas can easily invest in extensive groundnut production.

Similar approaches will be developed and used to map development domains for various legume production systems and their associated value chains.

*While the ISPC and FC considered the GL final proposal adequate (in February 2012), in each of their three commentaries the ISPC highlighted the need develop a more focused and rational agenda. They recommended strengthening the justification for a CRP on grain legumes, and developing (and applying) a more systematic approach to priority setting across crop species, regions and constraints in the context of delivering impact.*

These points are well made, but the justification for supporting grain legume crops in agricultural systems rest on very broad considerations such as their contribution to the proper management of the nitrogen economy and their energy efficient production of protein. The systematic priority setting is to identify those locations where interventions by the CRP can have maximal effect; this is a continuing function of FP6.

*Issues related to narrowing the focus (fewer product lines), articulation and justification of impact pathways, implementing a rigorous M & E system, and more effective integration with other CRPs (and with the private sector) were also highlighted.*

The guidelines for the Extension Phase Proposal stated clearly that ‘CRPs cannot propose major changes in their research strategy’ so no major alterations to the structure of the program were made, the *description* was changed from a Product Line focus to one based on Flagship Projects as suggested in response to our 2014 POWB. The number of Product Lines remains the same because we have not dropped any output targets, while we recognise that these could be aggregated in different ways, this does not seem a worthwhile exercise. The implementation of a more rigorous M&E system and results based management are clearly stated objectives for the extension period that cad presage more radical changes for a possible second phase proposal (however that may be configured). Integration of activities with other CRPs is envisaged as was proposed in joint funding within the grants scheme.

*Some developments along these lines have occurred, e.g., work begun to articulate specific IPs for specific output targets, strengthening M & E processes. However, it does not appear that enough has been done. For example, there is little evidence of the CRP undertaking any rigorous demand analyses (to substantiate the claims made about increasing consumption), or synthesizing studies on adoption constraint analyses, or having done priority setting - by crop and region based on need and impact potential. SC 1 was supposed to do the latter but there is no report of an output or even an activity from this SC. The lack of prioritization may reflect a strong tendency for continuing along existing lines of Center work (budgets also reflect this). The extension proposal does not appear to have made use of any external strategic studies, including ISPC’s strategies and trends papers or cross-CRP studies, in developing or refining its agenda thus far.*

We agree that enough has not been done, and that is precisely why we propose strengthening our priority setting, M&E and aligning many components of our activities with other CRPs, for example through CC2. Demand analysis is to be strengthened in the extension phase through FP6/CC1: these activities have not been completed.

We recognise that there is continuity of work within the CRP and prior activities at the participating institutions. To disconnect these activities would be an expensive waste of resources, so the realignment of activities is progressive rather than dramatic. In the extension phase approximately 1/8th of the budget is to be allocated on the basis of proposals to be judged on the basis of their
content rather than their location or institution. We consider this a significant shift that will test the implementation of the process that will lead to a major change in a second phase proposal.

It is not clear which ISPC documents are referred to, and indeed the request for further analyses of trends and potential impacts. Several studies were completed in 2012 that informed the content of the proposal document. These, in part respond to limitations in other reports; for example the 2011 SPIA report “Global and Regional Trends in Production, Trade and Consumption of Food Legume Crops” for example points out that “for ‘common beans’ (Phaseolus vulgaris), there is no one-to-one correspondence between this crop and the categories reported in FAOSTAT”. This study did not include groundnut, and while soybean was (reasonably) considered only with respect to West Africa, it is a large commodity worldwide (larger than wheat) and has huge consequences for the price and trade in pulses - for example ‘virtual lentil flour’ has been prepared by mixing the protein fraction of soybean (after oil extraction) with wheat flour. This type of intervention needs to be considered with respect to the economics of pulse production.

We agree that further studies need to be undertaken at a regional and crop level.

*The extension proposal does state that it is too early (still) for radical changes based on amalgamation. Changes are mainly sequential.*

This is reiterated above, at the time of writing the extension phase proposal the project management team had been in place for less than one year. Dramatic and untested changes could have been proposed, but these would reasonably have been viewed as reckless and unproven propositions.

*This is unfortunate as it would be useful to see a listing of efficiency savings, legacy projects/targets, etc., that have changed and are likely to be changed in any 2nd phase of the program.*

We agree that such a listing would be useful, and that such changes are needed.

*(Nothing has been identified as either ‘completed’ or as ‘new’).*

Completed tasks are the output targets identified with end dates in year 1 and year 2 of the initial proposal. These are to be commented upon in the Annual report for 2014. Most output targets identified in the original proposal will be ‘due’ in the timeframe of the extension phase, we judged it best to ensure that the investment of two years’ work should not be discarded and we should endeavour to achieve these stated targets within the extension phase.

*Equally helpful would be to have had an analysis of the added value to science (not just to management) from the mergers.*

This is an important analysis and one that needs to be completed quite urgently. Clustering’ of CRPs similarly suggests that there are efficiencies and synergies to be had from combining work on different crops. We need an analysis of the benefit of working together on these different but related crops. Hopefully the Review and Validation Study will have some useful comments to make in this area.

*The proposal does indicate that the extension phase “is mainly about consolidation and focusing of effort”. This task will be aided by the expected development of impact pathways for individual output targets (making monitoring doable, not aspirational) and by underpinning the ToCs with an IMOD approach. Already the CRP has selected 8 Product Lines based on a priority setting process described in the initial CRP. It continues to monitor the activities of these Product Lines through annual deliverables.*

Agreed.

*In summary, a number of positive developments and change processes are underway for this CRP (e.g., focused monitoring of the activities to create outputs), there is still a need, however, to address some of the earlier issues raised by the ISPC, particularly related to priority setting.*
We strongly agree that priority setting, together with monitoring and evaluation of progress are essential for managing the direction and focus of the project. Our current design is a consequence (necessarily) of those that have been completed to date.

1. Intermediate Development Outcomes, Theories of Change and Impact Pathways
1.1 Plausibility of ToC and Feasibility of IPs:
The ToC is defined around the discovery, development, and delivery of seed based legume technologies and the crop management practices that reduce risk exposure and/or improve productivity. Underpinning this ToC is an approach developed recently by ICRISAT ‘Inclusive Market Oriented Development’ or IMOD, that believes the key to improving prosperity is increasing access to input and market opportunities. This is a plausible hypothesis. At the program level then, this CRP uses the IMOD approach to “… identify targets for intervention, and to assess the performance of activities with respect to the aim of improving the livelihood of smallholder farmers as well as the urban and rural poor.” The plausibility of the ToC of GL is predicated on whether smallholder farmers who are willing to adopt improved varieties (seed-based approaches) will also adopt IPM and BNF outputs to allow the crop/pest/disease management components to act synergistically. This ToC may be difficult to achieve as there are few successful examples of multiple adoptions of improved varieties and IPM/BNF at scale globally.

A theory is indeed an hypothesis, and while we hope our ToC is plausible we also want to monitor or progress towards achieving our objectives. As mentioned above this theory of change includes possible negative effects – the potential for disempowerment of women or the potential for increasing the workload of smallholder farmers for no financial gain. We see these potential pitfalls as important to monitor and to include in priority setting.

We agree that we are unlikely to achieve such spectacular adoption at scale as is represented by glyphosate resistant soybean, and indeed global adoptions are necessarily few. However, we do not see the technologies such as IPM or varietal improvement as contingent one upon another and our eight Product Lines represent independent strategies for adoption targets.

As presented (on the website), the overarching ToC appears clear and simple, although lacking in impact pathways. The ToC however is not yet complete – impact pathways are promised for each target output by the start of the extension period. The research team is encouraged to complete them as a matter of priority, and to include in each impact pathway assumptions underlying progress along the pathway, consistent with the assumptions underlying the overarching ToC. Two examples given in the extension proposal (p4) include the useful feature of numbered points along the pathway corresponding to indicators for which data will be collected in the M&E system. However they do not include assumptions—these are to be found elsewhere in the extension proposal in a discussion about IDOs, and are more generic in description.

These comments are a reasonable statement of our present state and intentions.

It is important to be clear how this IMOD strategy will be adapted to take into account the special conditions and characteristics of grain legumes in the target regions. They differ significantly from other, particularly cereal, crops. Grain legumes are often grown in small farm sizes often by women, in rotation or intercropped with cereals. Demand is growing (but needs documenting and qualifying), market potential is thought to be high, and have significant positive externalities in terms of nutrition and environmental quality. In addition, these crops tend to be undervalued as reflected in the limited policy and R&D support they receive. One size therefore will not fit all. A more nuanced targeting priority setting strategy and impact pathway is needed to enhance the overall impact and relevance of this CRP. How IMOD will be adapted and made more relevant to address these special circumstances of grain legumes and how the new ToC strategy will actually be used as a “framework for priority setting” for targeting 5 interventions (as indicated on p2) should be clarified.

These are reasonable comments. The IMOD strategy was described as a theory of change underlying our proposed interventions (p2), the basic idea is that this “highlights value returned to smallholder farmers through agriculture and diversification” (p2) rather than productivity increase per se. For
example Harris D and Orr A. 2014 argue that some interventions that would increase productivity are unable to lift smallholders from poverty without additional changes to their livelihoods, diversifying sources of income or increasing farm size. Furthermore productivity gains that are matched by reduction in unit return to farmers will neither succeed nor improve the lot of our target group. This means that focus on the biology of constraint alleviation alone will sometimes be insufficient to achieve our intended outcomes.

...What priorities have changed as a result of using IMOD? ...

In fact there are none, but the focus on technologies that can accrue benefit to the farmers we consider helpful in focussing our activities and approaches..

... Why, for example, is IDO 4 perceived to be the main target (vs IDO 1 or IDO 2). It’s reasonable, but it should be explained and justified as there are priority and strategy implications. At the same time, it is not clear why more attention and priority is not given to IDO 5 (environment), given grain legumes’ unique attributes. Other concerns about the ToC and impact pathway are:

In the extension proposal we were encouraged to present an estimate of costs for each IDO. IDO4 “Productivity: Improved productivity of farming systems, especially among smallholder farmers” represents approximately 50% of the estimated W1/W2 budget and is a similar proportion of W3/bilateral funding. Furthermore the other IDOs are to a large degree dependent on production – without grain legume cultivation they cannot present any environmental benefit in an agricultural system (IDO5) nor can they contribute to farm income (IDO2). Food and nutritional security could be achieved by purchasing grain legumes produced elsewhere (as is the case for the urban poor), but we consider the benefit to farmers is in part due to their consumption of home production and in this case IDO1 and IDO3 (Food and Nutritional Security) are dependent on IDO4. For these reasons it seems clear that productivity is the main direct and also indirect target of the program.

In a number of cases the targets seem too ambitious, e.g., 15-20% increase in income for at least 2.5 million households by growing heat tolerant varieties of chickpeas, lentils, faba bean; or 100% yield increases among adopters of climbing beans in SSA; or 20% increase in pigeonpea consumption in rural India (seems highly unlikely).

These are helpful comments and it is good that we are not considered under ambitious. These figures were based on the analysis of White (referred to above). In some cases estimated impacts in terms of productivity are very high because heat causes severe yield loss. Obviously the focus by location has a major effect on such impacts, they are higher in target areas than globally. Nevertheless we accept this as a challenge to check the breadth of these impact estimates at a fine geographical resolution and to attribute these clearly by constraint.

Furthermore these presentations of percentage increases mean different absolute amounts in different circumstances we accept that these need further clarifications and the explicit estimations should be made publicly available by FP6 during the extension phase,

Where adopted, climbing beans have easily doubled yields over the standard bush beans. The current issues around adoption of climbing beans is not their potential to increase yields, but rather their adaptation to new environments (especially warmer environments), and finding adequate and cheap staking materials in each local setting.

Increasing consumption of GLs (IDO 3), especially among the poor, is by no means a trivial objective. Lowering prices of GLs may be the most effective means to achieve this objective, which in turn implies the need for large increases in production - locally or regionally. This suggests the need to consider targeting not only small
holders, but perhaps medium and even large farms in better endowed areas where commercialization offers the best prospects for that. At least consideration needs to be given to this strategy.

Agreed that increased consumption is a challenge. A major route to meeting the demand not met by local production is through import (see the comment on bean trade corridors above). The growth of Canadian production exported to India over the last 10 years is an example of efficient large-scale farming meeting one of our objectives (assured access), however this is not associated with increasing income to Indian smallholders or providing them with the soil health benefits of legume cultivation; we need to consider the trade-offs between our IDOs as well as each individually.

Evidence that people want to eat more grain legumes than are available from local production is seen in the importation of beans to Africa, or pigeonpeas and chickpeas into India. A 3-month study (yet to be published) of bean in Rwanda in undertaken in HarvestPlus showed that college age women ate the equivalent of 60 kg/yr, while the national average is 30 kg.

Assumptions and risks, especially to obtain ‘reach’ appear simplistic in many cases. Each of these assumptions should be considered carefully and challenged internally; many constitute relevant researchable topics in their own right. It is not always evident that the major constraints have actually been identified (which in many cases may not be lacking research); it’s often the uptake pathway and the demand for those products that have to be examined. Often these are THE key issue, and simply advocating ‘a new attitude towards legumes’ is unlikely to work (re: “All must be encouraged to consider legumes an indispensable part of the diet and farming system”). If, in fact, many of the critical bottlenecks are related to uptake and adaptation of existing technologies (tested on-station/on-farm and deemed appropriate), rather than the generation of new technologies, emphasis should be on uptake analysis and downstream partner capacity (and strategy).

These cautionary comments are well taken, and the comment on their ‘researchability’ fits well with the projected FP6. We accept that there may be constraints which have not been recognised, and these may be geographically heterogeneous. Indeed some constraints may not come to bear because some other constraint has caused prior loss. Synergies between constraints may also exacerbate problems and while some of these have been identified others may be unknown.

Failure of the uptake pathway is indeed a risk factor, and there are several potential reasons for failure, some are external to Grain Legumes, but others may be more under our control, such as market acceptability.

1.2 Contribution to common IDOs and SLOs:
The CRP will contribute to 5 IDOs related to food security, income, nutrition & health, productivity and the environment, with the main contribution being to productivity, which seems appropriate. More discussion and description of the impact pathway towards the other IDOs, e.g., IDO 5 (environment) would be useful. The CRP provides a set of metrics for each IDO including a comprehensive list of ongoing activities and targets. To measure them all would be a sizeable task in its own right. A more focused and doable set of targets is required. In addition, developing the ToCs for the individual output targets will better enable the CRP to monitor progress towards outcomes. These are largely seed based products with a plausible pathway to the IDOs, mainly to IDO 4 (productivity).

Agreed

Annex 1 provides a comprehensive list of the “assumptions” needed to meet the IDO targets, particularly assumptions in “attaining reach” and “changed behavior-outcomes” which are, to a large extent, in the hand of other partners. These impact pathways have operational metrics that can relate the activity/Product Line to the IDOs in a logical way. This is ongoing and to be encouraged.

Agreed

2. Flagship projects – FP
GL has recently realigned its product lines into FPs in the context of the R4D process leading to IDOs. Product Lines remain intact, and run through the FPs to provide the outcome focus in this process perspective. FPs 1 to 5
identify the crop interactions with biotic and abiotic constraints (FP1), the trait discovery and deployment pipeline (FP2 and FP3), the seed systems required for their adoption, and markets that produce income (FP4), capacity (FP5). There are also two crosscutting areas (CCs). FP4 and FP5 work together for the assessment of impact, redefining priorities and assessing gender components of priorities and activities through CC1. A new cross-cutting area, CC2 will be developed for high throughput genotyping and associated bioinformatics.

The FPs are aligned with the main objective of this CRP- increasing production, sales, consumption and beneficial contribution of farming systems of grain legumes that reduce poverty, hunger, malnutrition of smallholder farmers and their households, while improving the health of mankind and sustainability of farming systems. Similarly, the FPs are expected to contribute to the IDOs with measurable achievements once the indicators and metrics have been defined and agreed.

Agreed, but the Product Lines also do this; they are another way of describing groups of output targets.

There are a number of specific issues related to the scope and orientation of several of the FPs. FP2 and FP3 describe the overall priorities for the allele discovery, allele development and allele deployment. While the biotic and abiotic stress factors are well identified, more clarity is needed on what will be done for each of the different legume crops and which agro-ecologies or geographies will be targeted when addressing specific biotic or abiotic stresses. ...

Agreed and this is properly part of the POWB

... Proper targeting and definition of the breeding strategy requires a more nuanced definition that takes into account both agro-ecological and socioeconomic conditions, including the market preferred traits, demand patterns and the role of private and public sectors in legume R & D. The market traits (e.g., grain color, shape and size) are particularly important in legume trade and domestic markets. ...

Agreed

... Whereas herbicide resistance and mechanical harvesting are important for commercialization of legumes, ...

This is not exclusively the case, mechanisation can also be of benefit to small scale producers

... the market and nutritional traits need to be considered in the breeding strategy as part of trait discovery and variety development and cannot be an afterthought. The same is true for legume intercropping and rotation.

Agreed.

An integrated approach (with soil fertility management, rotations, intercropping, etc.) is needed to increase productivity, income and the environmental sustainability from GL. ...

This is not entirely clear. It is the integration of legumes in cropping systems that improves soil fertility and system productivity rather than vice versa.

... The extension proposal does not present how this can be achieved and much of the emphasis seems to be on germplasm development to address biotic and abiotic production constraints. ...

The issue of germplasm development was discussed above, it is true that a substantial component of the program is aimed at crop improvement, but our emphasis is not on germplasm development.

... Given that the yields of many legumes are so low, good agronomy and crop management will be critical in terms of soil and water management as well as pest control to improve productivity, including finding the right incentives to facilitate adoption of those interventions. FP1 would need to bring some innovative integrated agronomic and socio-economic research that will allow attaining the full potential of seed technologies.

Agreed. Fertilizer use for example could mitigate the problems of low P availability, but some useful interventions may be too costly; stimulation of the market can potentially increase the price a farmer can get for produce so market stimulation may be an alternative route to achieving some of our objectives.

Careful assessment of the potential for public-private partnerships in legume seed systems (FP4) is required. ...
Agreed, and to a limited extent this is already underway.

... More innovation and critical thinking is needed to make the seed systems research more useful and relevant to local conditions. This needs to be supported by active socioeconomic research to make this more strategic and bring transformative thinking on how seed systems work has been done for years on legumes.

This comment is not entirely clear. We agree that socioeconomic studies (FP6, formerly CC1) are an important component of the program and that understanding how best to engage with groups active in the agricultural system (for seeds systems IPM and ICM) is also needed and understanding these processes could improve the effectiveness of our interventions.

Cross-cutting issue: Despite the importance of gender issues, markets and global trade for grain legumes, none of the FPs adequately highlight the importance of multi-disciplinary approaches in addressing the unique challenges for legume intensification, systems diversification, market development and commercialization. One research area, for example, could be to understand and enhance the under-exploited market opportunities in domestic, regional and inter-regional trade, e.g., between Asia and Africa for many of the pulses. ...

Interestingly the growth of chickpea and pigeonpea production in East Africa were with this in mind, but their growth in production has also been associated with a growth in home consumption, so we agree that this is a complex issue. For Product Line 3 on reducing aflatoxin in groundnut there has been success leading to trade opportunities, but again we need to be aware of the trade-off in that there is potential for the sorting groundnuts according to contamination to increase the exposure in the home market. These are indeed areas of concern for the CRP and worth considerable study.

... The same can be said for seed policy issues to understand the market failures and the potential of policy harmonization to expand seed markets and encourage private sector participation. Socioeconomic research needs to be more evident in this CRP and linked to both product development and delivery objectives.

Agreed

3. Gender

Gender is reasonably well integrated into the strategy and to some extent into the work program. The CRP gender strategy describes how an improved understanding of social inequity in target communities will inform research priority, technology generation, deployment and promotion. The CRP plans for an expansive set of gender activities where gender analytical research will aim to identify areas where interventions may have significant gender disaggregated differential effects. It appears that gender mainstreaming in this CRP is being taken seriously.

Agreed, but it remains a structural issue in terms of project management, and this is to be addressed in the extension phase.

The program partners have a long history of working with women and men farmers and the extension document and 2013 Annual Report includes examples where it is obvious that gender issues have been considered. Although none of the long list of publications on the website has gender in the title, and a rapid scan of a few scientific publications revealed no references to gender, the most recent formulation of the program makes work on gender more explicit and ensures that there will be a budget (10% of total) allocated to it.

Agreed, this remains work in progress.

4. Partnerships

This CRP notes that its partners vary according to activity, region and country and that reach, scope and depth are all considerations for identifying partners. The CRP highlights NARS and regional organizations as key partners for varietal development activities and also puts some of its key partners as members of the various committees in its governance structure. This is consistent with its belief that partnerships are most effective when formed around joint actions, such as topically (and often geographically) oriented projects. More specific information about the roles of partners in specific FPs would be needed in order to assess the relevance and quality of partnerships and how this relates to the ToCs.
Agreed and the formulation of these partnerships are in part determined by the partnership funding as a component of our grants scheme as well as the W3/bilateral funding.

*Strategic partners are well defined with a healthy mix of developing and developed nation institutions, and a significant number of NARS and others. Joint work plans are also being initiated with some of its key NARS partners. Stronger linkages are being sought with all other major initiatives on legumes. The CRP mentions a few important links to ARIs. Given the world-class uniqueness of this CRP in legume research, it is hoped that the CRP can attract more self-funded ARI partners based on its science merits.*

This would be good, but ARIs are also dependent on funding. These partnerships may well work through alignment and information exchange as well as through formal projects (such as the lentil genome sequencing project for example)

*It is expected that this CRP will form close linkages with the systems programs especially for drylands and the humid tropics (CRPs 1.1 and 1.2). These may have already been made with Drylands systems but links to Humidtropics are not mentioned ....*

This is correct. The link with Humidtropics does not (obviously) include the species cultivated elsewhere. The SIMLESA project is a good example as is the maize legume intercropping work at IITA.

*... Also, it is puzzling that no linkages have been made with CRP LF for development of dual-purpose varieties....*

This is (in part) a fair point. Discussions with Livestock and Fish are at an early stage, but at an institutional level there have been collaborations in this area, but these do need to be explored more fully at the CRP level. The lack of forage legumes in this CRP is a further impediment to interaction and there would be much to be gained in a legume CRP rather than a grain legume CRP – many ARIs move easily between these species.

**Linkages with Livestock and fish are presented in 1**

*... Grain legume residues (e.g. cowpea, groundnut etc.) are valuable and highly nutritional sources of fodder as dual-purpose crops especially in dryer systems. Linkages with A4NH are specified for genetic enhancement of nutritional value focused on improving the iron and zinc concentration in bean and lentil and for anti-nutritional aflatoxin management. This CRP needs to clearly describe its linkages to other CRPs through a table or a matrix. Attribution and transparency are critical where different CRPs contribute to different activities in the same value chain. In order to document “shared impact”, linkages should be clearly defined in impact pathway schematics.*

**Agreed as above**

*The CRP appears to struggle with partnering with other CRPs because, in part, of the reliance on W3/bilateral funding which it says, favors single line reporting. The CRP is experimenting with studentships and competitive grants to provide a catalyst for more CRP partnering.*

To an extent this is true, and we are in the process of clarifying the inclusion of W3/bilateral projects. Some W3/bilateral projects are large and comparable in scale to the W1W2 funding in the CRP (e.g. Tropical Legumes or N2Africa).

*The CRP outlines partnership budget to be about 10% of the FP (or PL) budgets. It has also allocated a further USD 2 million to a grants scheme to fill gaps in research needs and strengthen research capacities.*

**Agreed**

*In summary, the program is paying considerable attention to partnerships and should be commended as such and be encouraged to further improve partnership linkages, in particular with ARIs and CRPs. It should also consider explicitly defining a ‘partnership strategy’.*

These comments are welcome.
5. Regional Collaborations
The CRP highlights some of its important partnerships in the section on Regional Collaborations at local and global levels. Some examples of “strategic partners” (could be called regional partners) in different countries are the Ethiopian Institute of Agricultural Research, for the delivery of improved legume varieties to Ethiopian farmers, the Indian Council of Agricultural Research for activities in India, the Institut National de la Recherche Agronomique in Morocco - a key partner for ICARDA; the PABRA network for seed systems which acts as a broad regional coordinating body; and KARI in Kenya for multiple interactions on chickpea, common bean, cowpea, groundnut, and pigeonpea.

The development of joint studentship plans will further strengthen these partnerships. The CRP also links with strong and well-established crop networks such as PABRA, Cereals and Legumes Network, N2Africa and other key players.

Agreed

6. Phased workplan covering the 2 year extension period until 2016
The Workplan for the extension period 2015-2016 is given in Annex 2; with deliverable dates for milestones and output targets in Annex 5. The extension phase of GL is mainly about consolidation and focusing of effort (but insufficient detail was provided to assess that effort), hence it is aligned with the original proposal and realignment with on-going donor funded projects. The Tropical Legumes (TL) Project (funded through W3) will target a subset of the crops and countries of interest to GL. It will therefore be necessary to develop a plan for spillover countries. ...

This is indeed the case, as is the need to deal with the further geographical and crop focus that TL is implementing.

... The realignment of the GL according to FPs rather than Product Lines, emphasizes the process of technology development and deployment. Nevertheless the Product Lines remain the focus and coordinating principle. The Product Lines target technological developments that are expected to add value to on-going work, and to have maximal impact for GL production and use.

Agreed

The workplan does not distinguish what is new from what is on-going ...

Agreed, however this is implicit for example in the comment “A new Cross-cutting area, CC2 (now FP7), that we intend to develop”, “a new BMGF initiative the ‘genomics back-office’” etc.

The comment is somewhat perplexing; does new refer to new within Grain Legumes or new to the extension phase? Does a new activity correspond to research that had not previously been undertaken within the CGIAR research on grain legumes? What utility is served by distinguishing ‘new’ from ‘on-going’ work with respect to describing the workplan?

Activities in Grain Legumes were selected based on an analysis of the potential for impact by region crop and constraint. Some of these activities built on or expanded work that was previously being done and other areas previously active were not included in the program.

... and what may have come to an end.

The extension phase proposal did not discuss work it will not pursue.
7. Budgets

7.1 Coherence with original proposal and distribution among the FPs: The Budget is not altogether clear. It appears that the budget for 2015-2016 is based on the ‘average’ budget from 2012-2014 and seems to be coherent with the budget proposed in the original proposal. The 2015 budget is roughly similar to 2014, but the program requests a 20% increase (USD7 million) in 2016. The latter requires some justification, especially in the light of the statement “Budget partitioning between participating Centers is largely unchanged”. This is disappointing, and would seem to suggest little serious movement toward re-strategizing. Furthermore, the total increase in the 2016 budget is evenly allocated across all FPs and CCs at a 15% increase, again, not indicative of a strategic choice. The major share (about 37%) of the FP budget is with FP 2 and 3 (varietal trait discovery and deployment), which is similar to the Dryland Cereals budget allocated to varietal improvement.

The 2015 budget was set by the Financial Plan for 2015 issued by the Consortium Office on 6th December 2013. This plan was based on a budget that was low because the 2013 budget was inexplicably high with the 2014 and 2015 budgets having been reduced to balance the total project budget. Agreed that this is far from clear. However, it is clear that the 2014 and 2015 budgets in this scheme were unusually low with respect to the total budget for the program.

For the years 2013 to 2015 the percentage changes in the W1W2 annual budget were:

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>% change in annual budget</td>
<td>1.44</td>
<td>-28.36</td>
<td>10.35</td>
</tr>
<tr>
<td>from preceding year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The 2015 budget can alternatively be considered a 20.9% reduction with respect to 2013 or a 18.9% reduction with respect to 2012 (had it been for a whole year). Our request is simply that the budget is not lowered in this way, and what we propose represents a 10% increase of the average annual budget.

Budget partitioning between Centres is not substantially altered and there is consequently no major change in crop priority (as was suggested in the guidelines for the Extension Phase Proposal that ‘CRPs cannot propose major changes in their research strategy’). We could have changed the budget allocation if we had removed some of the output targets agreed in the original proposal and created new targets not included previously. The guidelines for extension phase proposals stated that “CRPs cannot propose major changes in their research strategy, large-scale opening up of new research lines, or major changes in the geographies in which they work”. For these reasons owu proposed project is similar to that in the initial phase in content and budget allocation. However, the budget does deviate from this by assigning approximately 12% of the W1W2 funds to the grants scheme allowing us to test a more flexible budget allocation.
CO Comments to CRPs regarding 2015-2016 CRP Extension Proposals

CRP Name: Grain Legumes (GL)

A. Overall assessment of the Extension Proposal

Grain Legumes (GL) submitted an extension proposal conceptually clear and well presented. The CRP is in a crucial transition phase regarding the structure and organization of the program moving: from an old structure with 5 Strategic Components (SCs) addressing 8 product lines (PLs) classified by crop/trait, into a new organization with 5 Flagship Projects (FPs) and 3 Cross-Cutting Areas (CCs). The research activities clustered in these 5 FPs+3CCs are clearly identified and defined, with the corresponding budget to be allocated in 2015 and 2016.

The proposed new structure brings increased coherence to the program. By separating upstream research FPs for trait discovery (FP2) from variety production and seed delivery (FP 3 and FP4), GL now offers well-balanced activities between research and development to secure the delivery of products, tools and technologies, while increasing impact as well. In addition to the core central breeding block, the 3 CCs and FP5 support transversal needs on capacity building, partnership, knowledge and management. Strong specific effort is planned on breeding informatics systems in synergy with IBP phase II and a high throughput genotyping platform with the Genomic Center of Excellence. Both of these novel approaches are fully supported by BMGF and the CO. Finally, FP1 involves innovative scientific approaches which complement the breeding core business (FP2, 3 and 4) for producing grain legumes more sustainably (e.g. developing Integrated Pest Management, studies on nitrogen fixation, and new symbiotic micro-organisms).

The relevance of the five selected IDOs to be addressed by the CRP is clear and the set of activities managed through the 5 FPs + 3 CCs would allow GL to deliver research outputs and outcomes addressing these 5 IDOs and, finally, the 4 SLOs.

GL’s extension proposal was considered as satisfactory and ranked in the middle range of the 15 CRP submissions. The extension proposal does not need to be amended prior to submission to the Consortium Board for approval. However, we do require you to respond to the specific comments given below, together with the ISPC report (attached). In addition you are required to complete a performance matrix as per the attached template. We require these by August 25, 2014.

These comments are welcome.

B. Specific points that Grain Legumes needs to address

1. Intermediate development Outcomes (IDOs), Theories of Change (ToC) and Impact Pathways (IP)
   a) In Annex 1 page 16, indicators and targets are presented for the 5 IDOs addressed by GL with very precise metrics per crop (8 crops), trait and geographic location. We recommend including the timeline for reaching the targets.

   Agreed, and these will form part of the POWB for 2015 and 2016.

   b) Another recommendation is on the necessary level of granularity of the IP as GL states the “need to develop IPs at the level of individual output targets”. In addition to a generic ToC for the program as a whole, 5 sub-ToCs at the FP level would be sufficient to identify outputs to be delivered in response to the related assumptions by sub-ToC/FP and monitor progress towards outcomes.

   This is a welcome suggestion. The idea behind the Impact Pathways per Output Target is that these will connect our M&E strategy to the IDO targets, and the commonality that is expected between the IPs will identify the most important metrics to monitor at the higher level of FP or PL.

2. Flagship Projects
   a) The restructuring process has to be precisely defined, implemented and adopted; the current wording suggests a state of permanent transition, with the risk of presenting a confusing picture on the program’s coherency.

   This is recognised. The program with its current structures in place is less than a year old and the reorganisation is considerable, this is confusing and does represent a state of permanent transition. We anticipate some stability for the two years of the extension phase, but are aware that the second
phase may well represent yet another structural change. The focus on output targets as the atoms of
the program is intended to present a stable core and the structural rearrangements are in how these
are gathered together for management purposes. Again this reflects the need for IPs at the level of
output targets, because with each rearrangement these would otherwise require redesigning.

b) To harmonize the process at the portfolio level, we suggest that GL adopts 8 FPs by renaming the 3 CCs.
Indeed CC1 has a participatory approach “to enable exchange of knowledge & information from and across the
stakeholders including the smallholder farmers”, indicating an external connection for these activities.

We are content to rename the CCs as Flagship projects, but this sits a little uneasily with CC3 (FP7) as
the ‘management’ component even though it includes grants scheme that will correspond to
research activities.

c) The “non-breeding” components need to be strengthened, as, for example, in FP 4, which is a mix of issues
(seed systems, post-harvest, markets and nutrition) or in FP1, which does not include sustainable intensification
of the GL systems.

We will modify FP4 to include elements of sustainable intensification – this had been envisaged to
be a component of the agronomic work in FP1.4. The distinction between the work in FP1 and FP4 is
that the former would be upstream research and the latter implementation and demonstration.

d) In the different FPs and CCs, please add foresight activities and studies on the future role of the eight GL
crops.

We envisaged that the foresight activities would be within FP6 (CC1) Knowledge, Impacts, Priorities,
and Gender Organisation, and recognise that these need to be connected to the activities in other
FPs, that process is facilitated by the Product Lines, which remain a strong organisational principle.
By mapping development domains, in FP6, the programme will be able, for the medium term, to
undertake effective foresight planning.

e) An integrated view on the GL Value Chains should be proposed

A comparative analysis of value chains may be more appropriate representing regional and product
based differentiation, and this can assist in transferring knowledge and best practice between target
groups. This is fully a function of FP6 (CC1).

3. Gender

a) The gender budget should show the precise amount (and percent of total) budgeted for gender research. At
present the budget for gender is co-mingled with that for several other activities in the same crosscutting
theme. The text says 25% is dedicated to gender but there are no numbers in the proposal to substantiate this.

Agreed that this is done as part of the mainstreaming of gender activities. These are identified
separately for example in the POWB for 2014 and we propose to include this level of detail in the
2015 POWB rather than the project proposal.

b) The phased work plan including p.12 and the table on p.24 should specify some concrete gender research
outputs consistent with (a) expected achievements described in the section on gender and (b) the specific
budget for gender requested above. Currently the work plan is not consistent with gender description.

We will re-examine this in the light of the comment in (a) above and again this we propose to
include this in the POWB.

4. Budget

a) GL requests an increased budget for 2016 through the 10% requested by all the CRPs (meaning for GL
US$1,6m) plus an extra budget of US$1,5m for identified priorities such as (i) the studentships, grant schemes
and capacity building effort through FP5, (ii) the knowledge sharing and communication initiative in CC1 and
(iii) development of tools and platforms for genotyping and bioinformatics through CC2. For these specific
additional requests, the corresponding amounts have to be precisely differentiated by separating the regular
from the expansion budget.
This is quite clear and we can identify those things we will not be able to do in 2016 without these additional funds. These include the Studentship scheme (currently financed from underspend in the Management budget up to mid 2013) and the competitive grants scheme. It remains unclear what the source of funding is for the W1W2 matching funds for the BMGF ‘genomics back-office’.

b) Two additional activities will be supported to drive forward the informatics/genomics data back office in chickpea, in collaboration with Cornell University; and, secondly, for setting up and implementing an informatics breeding management system (similar to the BMS developed by IBP or equivalent). This needs to be described in the work-plan and budget for 2015-16.

Agreed that these CC2 (FP7) plans need to be further elaborated in the POWBs.
Annex 1 CRP-CRP Linkages

Dryland Systems
Currently the main interaction with DS is in the area of GIS data analysis mainly with respect to PL6 Extra-early chickpea & lentil

Humid Tropics
The link with Humidtropics is strongest with the soybean crop; the SIMLESA project is a good example as is the maize legume intercropping work at IITA.

Aquatic agricultural systems
No joint projects have been developed, though the potential for legumes as an oil/protein combination for fish feed has been explored elsewhere and is a potential area for collaboration.

Policies Institutes and Markets
The development of the Grain Legumes Gender Strategy involved strong links with PIM, and these remain in the implementation of this strategy. Impact analyses for legume crops have been undertaken within PIM and we expect that FP6 will continue to link with PIM.

Wheat, Maize, Grisp
Direct links with these three CRPs are few, but areas of common interest are being explored, for example with respect to seed systems and bioinformatics.

Roots Tubers and Bananas
Currently there are no joint projects but tuberous legumes are a potential area of joint interest.

Dryland Cereals
As with the other three cereal CRPs there are few common research activities, although these are being explored. As Dryland Cereals and Grain Legumes are both led by ICRISAT economies and efficiencies have accrued from the sharing of PMU activities.

Livestock and Fish
Several projects in India and Nigeria are underway (mainly for groundnut and cowpea, where Grain Legumes ensures that appropriate cultivars are available to L&F, while L&F reciprocally.

Agriculture for Nutrition and Health
The HarvestPlus program is an area of strong interaction between Grain Legumes and A4NH, as is the work on aflatoxin (PL3).

Climate change agriculture and food security
Interactions with CCAFS are notably in connection with responding to climate change particularly elevated temperature PL2, drought PLs 1 and 3, and with respect to changing patterns in the distribution of pests and pathogens PLs 5 and 7.

Germplasm
There are extensive interactions between Grain Legumes and the relevant Germplasm Collections, these provide a major route to accessing allelic variation. Systematic analysis of these at both genotypic and phenotypic levels is in progress.

Interactions with Water Land and Ecosystems and Forest, Trees and Agroforestry are possible, but will likely relate to activities at the level of farming systems and so occur through Dryland Systems and/or Humid Tropics.