**Social and Economic Assessment of Mutation Breeding Programme**

|  | **Criterion 1: Increased food production** | **Evidence needed** |
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| **Excellent**  (Exceeding expectations) | New varieties of crops contribute to a net increase in the overall production (over 10% in the area occupied by the new mutant varieties).  More than one desired trait is improved for some target crops. | Adoption by consumers   * Evidence base: FAO data   Productivity   * Total number of new mutant varieties * Yield increase (% and tonne/Ha) for each new mutant variety * Quality traits improved (description) * Growing areas (% and Ha) for each new mutant variety * Number of growing seasons per year   Increased incomes by farmers   * Estimate from productivity data   New mutant varieties adopted (assented) by policy makers   * Number of new mutant varieties adopted by policy makers, for each crop and country * Include # of green varieties   New mutant varieties commercialised   * Number of new mutant varieties commercialised, for each crop and country * Include # of green varieties   New mutant varieties with improved yield, resilience and/or quality registered   * Numbers of crops registered, for each crop and country   Include # of green varieties |
| **Good**  (Meeting expectations) | New varieties of crops contribute to a net increase in the overall production (5-10% in the area occupied by the new mutant varieties), *and* also produce some advanced mutant lines (i.e. potential to be released).  At least one desired trait is improved for target crops. |
| **Adequate**  (Meeting bottom-line expectations) | New varieties of crops contribute to a net increase in the overall production (up to 5% in the area occupied by the new mutant varieties), *and* also produce some valuable mutant lines (i.e. potential genetic material for further breeding research). |
| **Inadequate** | Criteria for adequate are not met. |

|  | **Criterion 2: Enhanced environmental protection** | **Evidence needed** |
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| **Excellent**  (Exceeding expectations) | For most target crops, each mutant variety/advanced line contributes to at least:   * 15% reduction in pesticide use, without significant reduction in production *or* * 20% reduction in artificial fertilizer use, without significant reduction in production *or* * 20% increase in water use efficiency, without significant reduction in production. | Reduced use of fertilizer   * % reduction in chemical fertiliser use for each mutant variety   Reduced use of pesticides   * % reduction in pesticide use for each mutant variety   Improved water use efficiency   * % increase in water use efficiency |
| **Good**  (Meeting expectations) | For most target crops, each mutant variety/advanced line contributes to at least:   * 8% reduction in pesticide use, without significant reduction in production *or* * 10% reduction in artificial fertilizer use, without significant reduction in production *or* * 10% increase in water use efficiency, without significant reduction in production. |
| **Adequate**  (Meeting bottom-line expectations) | For most target crops, mutant varieties/advanced lines contribute to 5% reduction in pesticide use *or* artificial fertilizer use *or* water use efficiency. |
| **Inadequate** | Criteria for adequate are not met. |

|  | **Criterion 3: Strengthened regional capacity and sustainability** | **Evidence needed** |
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| **Excellent**  (Exceeding expectations) | As a result of the support under the RCA programme:   * A sufficient number of trained, qualified experts in the region to sustain mutation breeding research *and* * Stakeholders contribute resources that enable expansion for breeding, dissemination of mutants, and contribution to knowledge (for example, royalties, public-private partnerships) *and* * There is a mutation breeding network within the country, with connections to many stakeholders *and* * The region contributes widely-cited publications in high impact journals. | Human resources and training   * Countries that have a national team in MB * Numbers of people trained in mutation breeding and associated techniques x qualification x country * Number of group trainings held vs planned * Description: training responsive to dynamic needs   Facilities   * Countries that can access a basic radiation facility * Countries that can access a field facility   Networking, collaboration and knowledge transfer – regional and national levels   * Description: nature and extent of formal, structured networks between GPs (e.g. Bilateral or multilateral collaborations, development and sharing of protocols, senior scientist workshops, information sharing and provision of expert missions to other countries)   Within country networks, national societies |
| **Good**  (Meeting expectations) | As a result of the support under the RCA programme:   * An increased number of participating GPs have a national programme in mutation breeding *and* * All participating GPs have a growing number of trained personnel in mutation breeding *and* * Some participating GPs are resource countries to the region and beyond *and* * Some participating GPs are contributing new knowledge and methodologies to the mutation breeding field (including training of trainers and scientific publications) *and* * The research programmes of some participating GPs attract funding from donors. |
| **Adequate**  (Meeting bottom-line expectations) | The planned trainings and workshops take place, providing minimum numbers of trainees. Pre/post tests indicate knowledge transfer.  The majority of participating GPs are engaged in networking (formal and/or informal) within and between GPs.  All participating GPs have experimental field facilities to carry out mutation breeding research *and* can access necessary laboratory facilities for mutation breeding in the region.  Policy makers and at least one other stakeholder (for example, donor, university, company) are supporting the mutation breeding programme. |
| **Inadequate** | Criteria for adequate are not met. |