	Crop: Cowpea **Function: Harvesting**	**SOP #**	IITA-CP-SOP06
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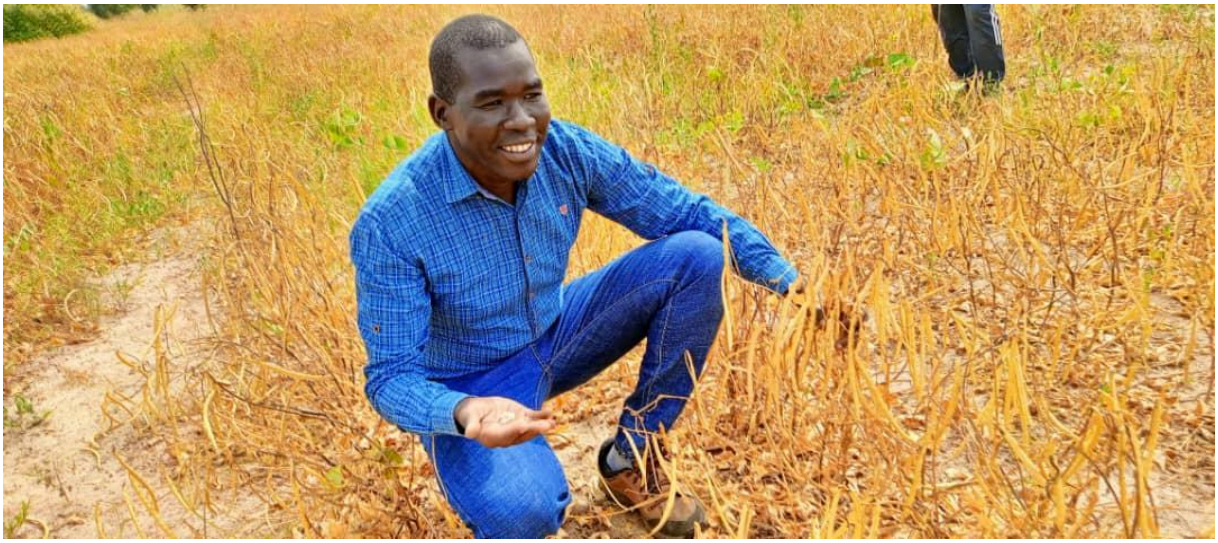
Standard Operating Procedure (SOP) for Harvesting



Authors & Contributors

Patrick Obia Ongom; P.Ongom@cgiar.org
Abou Togola; a.togola@cgiar.org
Christian Fatokun; c.fatokun@cgiar.org
Saba Baba Mohammed; s.mohammed@cgiar.org
Ousmane Boukar; o.boukar@cgiar.org

1. Introduction

Harvesting is another key activity in the cowpea breeding program that requires much attention. This is the stage where varietal seed mixing can occur. Timely harvesting is important to reduce bird damage, insect damage, and losses due to shattering and wet weather. Cowpea may be harvested when it is physiologically matured. At this stage, the moisture content of the grain is about 30%. Physiological maturity in cowpea is detectable when pods are dry; the seed develops a typical color of the variety and becomes hard, but before the seed shatters. For determinate lines, one harvest may be sufficient, while for indeterminate lines 2 to 3 harvests may be needed. Yield may be reduced by careless handling of dry pods and incomplete harvesting of pods in a plot. This has a significant impact on the quality of data, which will be used to compare the performance of the lines.

2. Purpose

This SOP is designed to provide the required procedures and what to consider during the harvesting of experiments. The guidelines should be followed by all involved in harvesting operations for uniformity of the trials.

3. Scope

The SOP covers all the aspects of the trial harvesting, beginning with harvest bag preparations, labeling, actual harvesting, and handling harvested pods.

4. Definition of terms

Harvesting is the process of gathering mature crops from the fields where they have been grown. It is the culmination of the growing season and involves several steps to ensure the crop is collected at its peak quality and yield.

Physiological maturity in cowpea refers to the stage of development when the seeds have reached their maximum dry weight, and the plant has completed its life cycle. At this stage, the seeds are fully developed and can be harvested for optimal quality and yield. Key indicators of physiological maturity in cowpea include pods change color from green to yellow or brown, the seeds become hard and firm, losing the green, soft texture they had during earlier developmental stages, and the leaves of the cowpea plant begin to yellow and drop off.

Days to 95% pod maturity is the number of days from planting to when 95% of plants produce matures pods in a plot. To assess the days to 95% pod maturity we take note of the date when 95% of the pods mature in the 2 middle rows of the plot.

Seed moisture content is the amount of water present in a seed, expressed as a percentage of the seed's total weight. It is a crucial parameter in seed physiology, affecting the seed's viability, storability, and quality.

5. Roles and Responsibilities

Cowpea scientists, research supervisors and field technicians must use the harvesting SOP to be able to handle harvest activities effectively. No alteration should be made to the procedures unless approved exceptionally by the program leaders. The individuals responsible for each section of the SOP are listed below.

Crop Lead breeder (CLB): Responsible for the overall management of the breeding program and for delegating team responsibilities. He is responsible for advising on the harvesting strategies for segregating populations and the trials.
Associate scientists (AS): Support the CLB with follow up and guide the research associates, supervisors, and technicians in implementation of harvest operations.
Research Associate: Responsible for distributing harvesting tasks to all supervisors and technicians. He should review the randomizations of all trials, harvest plot labels, and ensure harvesting procedures are being followed.
Research supervisors should ensure the plots have reached full maturity before authorizing harvest. Supervisors should also ensure that harvesting materials are available in time. They are also responsible for guiding the technicians and distributing tasks among them.
Field technicians: Responsible for implementing the activities related to trial harvesting including identifying the local resources (causal labours, discussing costs etc.) and needs to implement the activities.

6. Procedure

Harvesting yield trials

- Review randomization for all trials and use it to generate labels that will be placed on and inside the harvest bags.
- Get all your harvest bags ready and in sufficient quantity, and label them properly with plot numbers and visible variety names, include test location and year.
- Ensure that the plot has reached full maturity (pods are brown and/or dry) before you begin to harvest (see picures below).

Cowpea that is ready for harvest

Cowpea that is over dry and shattering.

Cowpea pods not yet ready for harvest

- Varieties should be harvested according to maturity groups
- Place harvest bags in each plot that are ready for harvest. Ensure the labels on the bags match the labels on the plot tags.
- Harvest only the two-middle rows for trials that have 4 row plots. For other Initial evaluation trials that have one row or two rows, harvest all the rows.

A plot of four rows with the 2 middle rows to be harvested

- Clearly separate the 2 middle rows and make sure that all the branches that may have covered the boarding rows are diligently pulled to the middle of the plot.
- Ensure that all pods are removed. DO NOT leave pods in a plot.
- For indeterminate varieties, green pods will still be present at harvest time, these green pods should be left and picked in a second round of harvesting.

- During the second harvest, write the same information on the bag and indicate on the bag that this is a 2nd harvest.
- Place harvested pods in the bags, seal them properly, and transport them all for proper drying and threshing.
- In case a single bag cannot contain all the pods of the plot, please use more bags with the same label and add on the bag 2nd bag out of x bags.

Harvesting progenies from segregating populations

These include several generations from F2 to F5, and each generation has special considerations for harvesting that must be strictly followed.

- F2 progenies must be harvested individually, and seeds placed in well-labeled packets. That is, each F2 plant must be harvested separately in its own harvest bag. The label on the bag should be prepared in advance using nursery records generated from BMS.
- For F3 progenies, one healthy plant per row should be identified at physiological maturity and tagged. The tagged plants in each row should be harvested in individual bags, again well labeled with BMS F3 nursery records.
- F4 progeny rows should be harvested in bulk. That is, all plants in a single row will be harvested and bulked.
- The F4s are often planted in striga hotspots to allow selection for striga resistance. As such, just before harvest, all F4 rows should be checked for the presence or absence of striga, and only those that are free from striga should be tagged for harvest.
- Records of dropped rows should be kept for use in BMS when advancing the generations.
- F5s should also be harvested in bulk (bulk the pods from each row together). Again, the F5 rows should be checked for striga, and those infested dropped.
- The harvested F5 seeds will be entered into the Initial Evaluation Trial.

7. Appendix

Contacts for support

Breeding support: Ousmane Boukar; O.Boukar@cgiar.org

Molecular breeding support: Patrick O. Ongom; P.Ongom@cgiar.org

Entomology: Abou Togola; a.togola@cgiar.org
Genetic support: Christian Fatokun; C.FATOKUN@CGIAR.ORG
Physiology support: Saba Baba Mohammed; s.mohammed@cgiar.org

8. Further reading

S.K. Dasgupta and D.L. Oswalt 1992. Agronomic practices for experimentation. Skill Development Series no. 2. International Crops Research Institute for the Semi-Arid Tropics Patancheru, Andhra Pradesh 502 324, India.
http://oar.icrisat.org/2414/1/Agronomic-Practices-for-Experimentation.pdf