

# **PHILIPPINE NATIONAL STANDARD**

PNS/BAFS PAES 243:2018  
ICS 65.060.99

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## **Agricultural Machinery – Cassava Digger – Specifications**



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**Foreword**

The Philippine National Standard (PNS) for Agricultural Machinery – Cassava Digger – Specifications (PNS/BAFS PAES 243:2018) has been prepared by the Technical Working Group (TWG) for various Agricultural Machinery as per approved Department of Agriculture Special Order (SO) No. 1045 Series of 2016.

This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2.

The word “shall” is used to indicate mandatory requirements to conform to the standard.

The word “should” is used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others.

## 1 Scope

This standard specifies the fabrication and performance requirements for cassava digger as a tractor-drawn harvesting implement.

## 2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

PAES 101:2000, *Agricultural Machinery – Technical Means for Ensuring Safety – General*

PAES 102:2000, *Agricultural Machinery – Operator's Manual – Content and Presentation*

PAES 103:2000, *Agricultural Machinery – Method of Sampling*

PAES 118:2001, *Agricultural Machinery – Four Wheel Tractor – Specifications*

PNS/BAFS PAES 244:2018, *Agricultural Machinery – Cassava Digger – Methods of Test*

PNS/BAFS/PAES 192:2016, *Agricultural Machinery – Guidelines on After-Sales Service*

## 3 Terms and Definitions

For the purpose of this standard, the following terms and definitions shall apply.

### 3.1

#### **cassava digger**

harvesting implement hitched to the tractor which loosens the soil to expose the tubers prior to manual pulling

### 3.2

#### **cassava harvesting**

process of loosening the soil, exposing and pulling the tubers out of the ground

### 3.3

#### **cassava tubers**

cassava roots

underground part of plant which has brown fibrous skin and starchy flesh

**3.4**

**coulter**

revolving disc or flat knife mounted in front of the digging blade which cuts the soil vertically

**3.5**

**depth of cut**

vertical height from the soil surface to the lowest point of the digging blade

**3.7**

**digger base plate**

a solid piece of material that has enough strength and sturdiness to serve as a base or support for the digging blade

**3.8**

**digging blade**

part of the cassava digger which penetrates and loosens the soil

**3.9**

**digging efficiency**

ratio of the dug and undug cassava, in terms of mass

**3.10**

**dug cassava**

cassava tuber manually picked after the mechanical digging

**3.11**

**field efficiency**

ratio of the actual field capacity and theoretical field capacity, expressed in percent

**3.12**

**four-wheel tractor**

self-propelled, wheeled vehicle having two axles designed to either carry, pull or propel agricultural implements and machines

**3.13**

**frame**

structure on which the standard is fitted

**3.14**

**standard**

structural member which connects the frame to the digging assembly

**3.15**

**soil breaker**

part of the cassava digger that breaks the clods

**3.16**

**soil guide**

part of the cassava digger which turns the soil to one direction only

**3.17**

**three point hitch**

part of the frame designed to connect the implement to a tractor

**3.18**

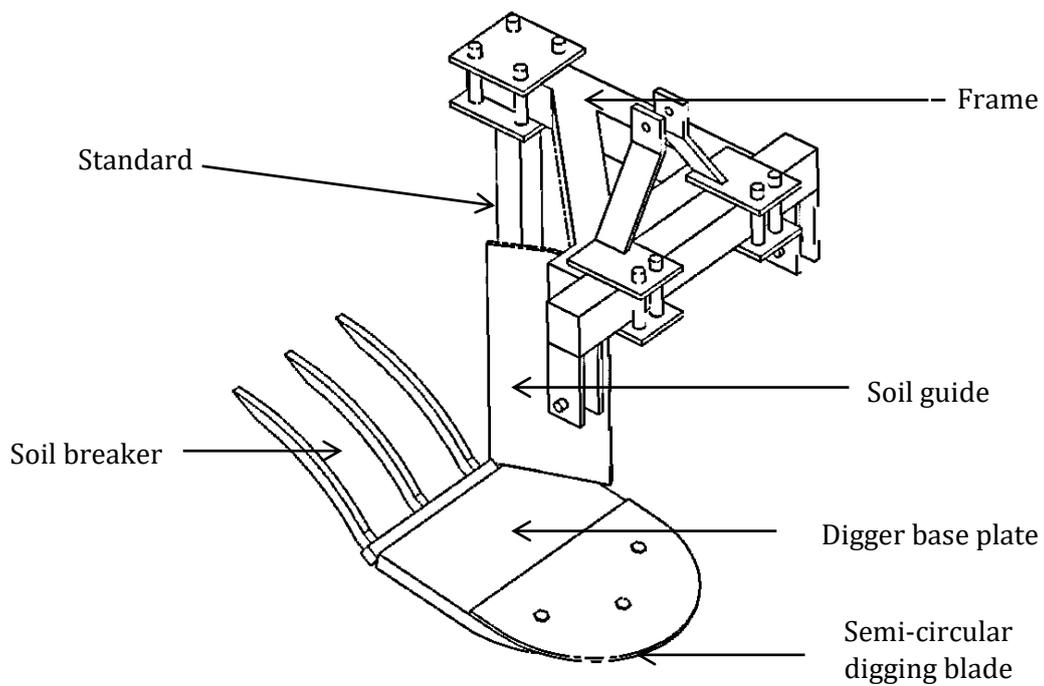
**undug cassava**

cassava tuber that remained on ground after the mechanical digging and manual picking

**4 Classification**

The classification of cassava digger should be based on the type of the digging blade but is not limited to:

**4.1 Semi-circular shear blade**



**Figure 1 – Semi-circular shear blade**

4.2 Pointed shear blade

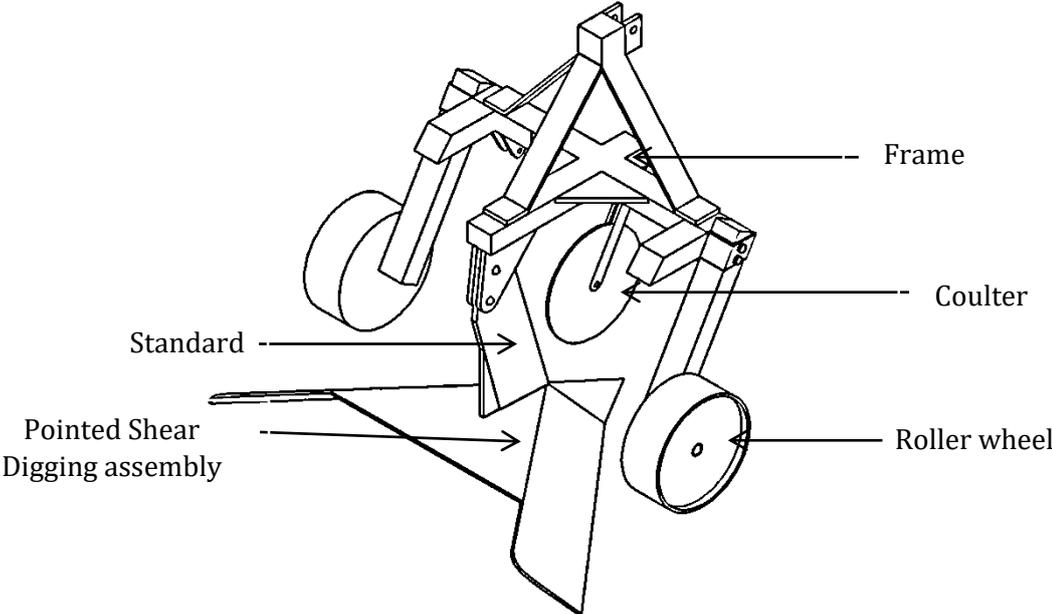


Figure 2 – Pointed shear blade

4.3 Fork shear blade

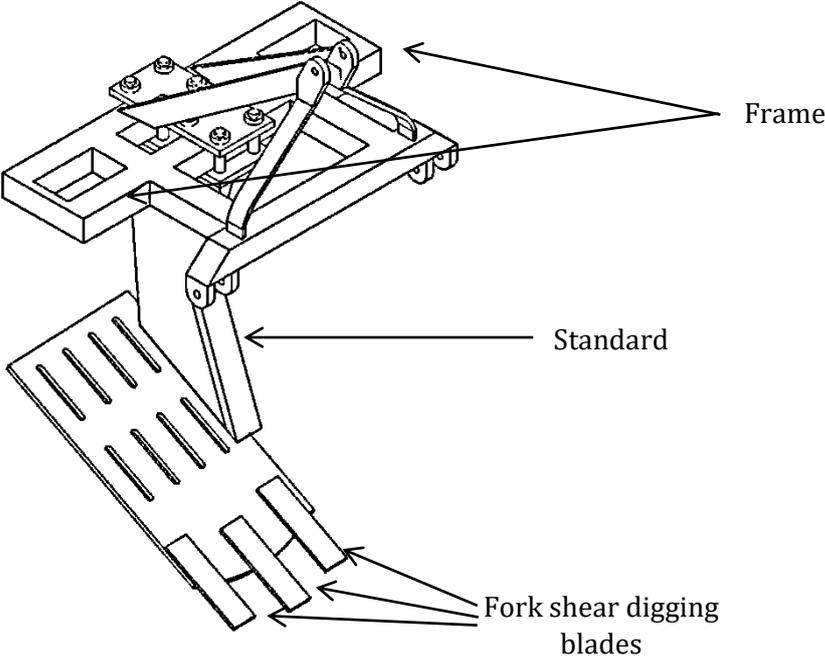


Figure 3 – Fork shear blade

**5 Fabrication Requirements**

**5.1** The digger base plate and digger blade shall be made of mild steel and hardened steel, respectively.

**5.2** The digging blade should be replaceable.

**5.3** Mild steel shall be used in the manufacture of the frame, thrust wheel and hitch.

**5.4** Carbon steel with at least 0.80% carbon content (e.g AISI 1080 or its equivalent) with trace amount of boron or equivalent alloy steel shall be used in the manufacture of digging blades and coulter.

**5.5** The frame shall have a provision for attaching to the tractor as specified in PAES 118: 2001.

**5.6** Bolts and nuts, screws, bearings, bushing and seals to be used shall conform to the food safety requirements, PAES or other international standards.

**6 Performance and Other Requirements**

The performance criteria for cassava digger shall be specified in Table 1.

**Table 1 - Performance Criteria for Cassava Digger**

| <b>CRITERIA</b>                | <b>PERFORMANCE DATA</b> |
|--------------------------------|-------------------------|
| Digging efficiency, %, minimum | 98                      |
| Depth of cut, mm, minimum      | 250                     |
| Field Efficiency, %            | 65                      |

**7 Safety, Workmanship, and Finish**

**7.1** The noise level should conform with the provisions given in Annex A.

**7.2** The cassava digger shall be free from any manufacturing defects that may be detrimental to the operation.

**7.3** Warning notices shall be provided in accordance with PAES 101:2000.

**8 Warranty for Fabrication and Services**

Warranty shall be provided for parts and services except for normal wear and tear of expendable or consumable maintenance parts for at least one (1) year upon the acceptance of the procuring entity of the cassava digger. General requirements of the warranty shall conform to PNS/BAFS/PAES192:2016.

## **9 Maintenance and Operation**

**9.1** Each unit of cassava digger shall be provided with a set of manufacturer's standard tools required for maintenance.

**9.2** Operator's manual shall be provided based on the PAES 102:2000, maintenance schedule, and list of warrantable parts of cassava digger shall be provided.

## **10 Sampling**

The cassava digger shall be sampled for testing in accordance with PAES 103:2000 or any other suitable method of selection.

## **11 Testing**

The cassava digger shall be tested in accordance with PNS/BAFS PAES 244:2018.

## **12 Marking and Labeling**

**12.1** Each unit of cassava digger shall be marked at the most visible place with the following information.

**12.1.1** Registered trademark of the manufacturer

**12.1.2** Brand

**12.1.3** Model

**12.1.4** Year of Manufacture

**12.1.4** Serial Number

**12.1.5** Name, address, and contact details of the manufacturer/importer/distributor

**12.1.6** Country of manufacture/origin (if imported) / "Made in the Philippines" (if manufactured in the country)

**12.2** Safety/Precautionary markings shall be provided. It shall be stated in English and Filipino and printed in red color with a white background.

**12.3** The markings shall be durably bonded to the base surface material. The markings shall be all weather resistant and under normal cleaning procedures. It shall not fade, discolor, peel, crack or blister and shall remain legible.

**ANNEX A**  
(informative)

**Occupational Safety and Health Standard (Rule 1074.01 – 1074.03)**

**A.1 Threshold Limit Values for Noise**

The threshold limit values refer to sound pressure that represents conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse effect on their ability to hear and understand normal speech.

Feasible administrative or engineering controls shall be utilized when workers are exposed to sound levels exceeding those specified in Table 8b hereof when measured on a scale of a standard sound level meter at slow response. If such controls fail to reduce sound within the specified levels, ear protective devices capable of bringing the sound level to permissible noise exposure shall be provided by the employer and used by the worker.

**A.2 Permissible Noise Exposure**

**A.2.1** The values specified in Table 2 apply to total time of exposure per working day regardless of whether this is one continuous exposure or a number of short-term exposures but does not apply to impact or impulsive type of noise.

**Table 2 - Permissible Noise Exposure**

| <b>Duration per day, hours</b> | <b>Sound Levels [dB(A)], slow response</b> |
|--------------------------------|--------------------------------------------|
| 8                              | 90                                         |
| 6                              | 92                                         |
| 4                              | 95                                         |
| 3                              | 97                                         |
| 2                              | 100                                        |
| 1½                             | 102                                        |
| 1                              | 105                                        |
| ½                              | 110                                        |
| ¼                              | 115                                        |

**A.2.2** If the variation in noise level involves maximum intervals of one (1) second or less, it shall be considered as continuous. If the interval is over one (1) second, it becomes impulse or impact noise.

**A.2.3** When the daily noise exposure is composed of two or more periods noise exposure of different levels, their combined effect should be considered rather than the effect of each.

If the sum of Equation A exceeds one (1), then the mixed exposure should be considered to exceed the threshold limit value. However, the permissible levels found in the table shall not be exceeded for the corresponding number of hours per day allowed. Noise exposures of less than 90 dB(A) are not covered by Equation A.

$$X = \frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3} \quad (\text{Equation A})$$

where: X is the sum of the ratios of C and T  
C is the total time of exposure at a specified noise level  
T is the total time of exposure permitted at the level

**A.2.4** Exposures to impulsive or impact noise shall not exceed 140 dB peak sound pressures level (maximum value).

**Bibliography**

Chalachai, S., et.al. (2013). A Critical Review of Mechanization in Cassava Harvesting in Thailand. Retrieved on April 1, 2017 from [https://www.researchgate.net/publication/262525704A\\_Critical\\_Review\\_of\\_Mechanization\\_in\\_Cassava\\_Harvesting\\_in\\_Thailand](https://www.researchgate.net/publication/262525704A_Critical_Review_of_Mechanization_in_Cassava_Harvesting_in_Thailand)

PNS/PAES 147:2010 – Agricultural Machinery – Field Cultivator – Specifications

PNS/PAES 121:2001, *Agricultural Machinery – Disc Plow – Specifications*

PNS/PAES 131:2004, *Agricultural Machinery – Moldboard Plow – Specifications*

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