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CASSAVA DRYING FOR ANIMAL FEED



CASSAVA DRYING

Why should cassava be dried?



Cassava is one of the most traditional crops in the Atlantic Coast of Colombia, and its yields are destined primarily for human consumption. In this region, cassava is very popular among low-income farmers since this crop can be produced at low cost and, in addition, is resistant to drought, grows easily on poor soils, and can be harvested over a long period of time.

The adaptation of this crop to the climatic conditions of the Atlantic Coast and its popularity among farmers result in high annual yields, saturating the demand in the market for fresh roots and generating price decreases and serious marketing problems to producers. The lack of alternate markets and the poor agroindustrial development of the zone aggravate the situation for cassava producers. One solution to these problems consists in sun drying the roots in order to obtain a product that can be stored during long periods without deterioration problems and then be used in the preparation of balanced animal feeds. This market represents a growing demand for dry cassava as a substitute for sorghum and other cereals.

Cassava drying is a simple process that can be done by the farmers themselves, allowing them to use the land and labor more efficiently, and offering them the opportunity to promote the formation and

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consolidation of associative or cooperative production, processing, and marketing groups. The establishment of an agroindustry based on cassava production will help create an alternate market through which farmers can commercialize important volumes of their annual production surpluses.

What does cassava drying consist of?

Drying is a process whereby most of the humidity in fresh cassava roots is eliminated and the resulting dry product can be stored during long periods of time without deterioration problems.

The process includes two basic operations:

- Clipping of the roots into small pieces
- Sun drying the chips on concrete floors

How is cassava processed?

The processing of a lot of fresh cassava includes the following operations:

Weighing the fresh cassava

Cassava is transported to the drying plant where it is weighed on a scale with capacity for various bulbs at the same time, thus speeding up this operation. If the roots have too much soil adhered, as is

frequent when harvesting coincides with the rainy season, they must be washed to avoid subsequent quality problems in the dried cassava

Cassava chipping

The machine used to obtain the small cassava chips consists basically, of a metallic frame with a chipping disc and a feeding bin. It is run by an electric or gasoline engine, in areas where electricity has not been installed. Under normal operating conditions the chipping machine can process approximately 4000 kg of fresh cassava per hour.

Spreading out of the chips

The cassava chips are distributed on the concrete floor of the drying area using a wheelbarrow and are then spread out in a uniform layer with a wooden rake.

One square meter of drying floor allows for ten to twelve kg of fresh cassava chips, under normal climatic conditions this load takes two days to dry. Larger batches can delay the drying process and smaller ones reduce installed drying capacity, but accelerate drying of the cassava chips.

Turning over of the chips

Cassava chips must be turned over several times during the day (6 to 8

times) to enhance the drying process, this operation is done with a wooden rake.

Recollection

When the cassava chips have reached the desired humidity level (10 to 14%) they are gathered and packed. The chips are dry enough when they crumble easily when pressed between the fingers. A wide wooden or metallic shovel is used to gather the cassava chips which are then packed in hemp or polyethylene sacks of approximately 40 to 50 kg per bull. Approximately 2.7 tons of processed fresh cassava are needed to produce 1 ton of dry cassava.

Storage and marketing

The facilities of the drying plant must include a storehouse with good capacity: approximately one cubic meter per 350 kg of dry cassava chips.

Dry cassava is purchased by corporations that manufacture balanced animal feeds. The product must be delivered at their processing plants and transportation of the dry cassava is on the account of the farmers. The dry cassava chips must meet certain quality standards (low content of humidity, fiber, and ash, and high content of starch), one of the most important is the humidity content, which should not be greater than 14%.

A Natural Cassava Drying Plant

How should it be organized and managed?

The natural drying process of cassava using solar energy, which is free and abundant, is carried out during the dry season of the year, lasting from 4 to 6 months.

The output of a drying plant during this period depends on the size of the facilities. For example, 6 tons can be dried in two days on 500 m² of concrete floor, accommodating 12 kg of cassava chips per square meter. This means the plant is in capacity to dry three 6-ton batches per week, or 18 tons of fresh cassava per week.

Table 1 shows the number of workers and hours required to carry out the different operations involved in the process. It can be observed that a total of 45 man-hours are required to dry a 6-ton batch of cassava, or 7.5 man-hours per ton of processed fresh cassava.

The tasks of weighing and chipping, and gathering, packaging, and storing demand more labor, but these activities are not permanent and can be carried out during those three days of the week when a batch of fresh cassava is being processed and the dry cassava later collected. The farmers themselves can provide the labor required by organizing work teams to process each lot of fresh cassava. For example, 15 farmers organized in an association or cooperative group can form 3 work teams of 5 farmers each, and each group can assume the

responsibility for processing one batch. Thus, each farmer needs to provide only one work day per week. The only task that must be carried out daily is the turning over of the chips, which is done by a permanent worker who is also responsible for the overall maintenance of the facilities of the drying plant.

The efficient performance of the drying plant requires a manager who must work permanently during the period of activities. He is the person responsible for plant operations and must be dynamic and respected by the group of farmers. He is in charge of organizing the work teams, supplying the raw materials on time, and controlling the quality of the final product.

Likewise the farmers' organization must have a treasurer in charge of making the necessary payments and collecting dues. Additionally, for its normal operation the drying plant requires permanent and lasting institutional support to guarantee adequate training to farmers in the technical and accounting aspects of the process.

How much does the plant cost?

The construction of a natural cassava drying plant having 500 m² of concrete floor demands an investment of approximately US\$7,340, as detailed in Table 2. The working capital for the operation of this plant is US\$4,300. Thus, total investment and working capital would amount to US\$11,010.

How can the investment be financed?

To finance the construction of a natural cassava drying plant, a duly organized group of farmers can request credit from financial entities for the development of agroindustrial projects, these credits are generally granted for 6 year terms, with a two-year period of grace at an annual interest of 21%.

The working capital necessary to operate the plant can be obtained through a line of marketing credit, this credit, to be used during the 4 to 5 months of plant operation, must have at least a one year term and low rates of annual interest.

Economic feasibility studies for natural cassava drying plants with floor areas of 500 and 1000 m² indicate that the process is profitable and therefore economically feasible under present cassava production conditions in the Atlantic Coast of Colombia.

How much does a natural cassava drying plant produce?

Dry cassava chips are used as substitutes for sorghum and other cereals in the industry or balanced animal feeds, and thus their market price depends on the price of cereal grains. Normally the market price for dry chips is equivalent to 80 or 85% the price of sorghum.

A 500-m² drying plant can operate approximately 20 weeks during the dry season of the year, from November to March, and process approximately 18 tons of fresh cassava chips per week for an annual production of 135 tons of dry cassava. The price of raw materials should not exceed 60% of total processing costs. An increase in the market price for dry chips, at the same purchasing price for the fresh roots, would increase the profitability of the operation. It is essential to increase crop productivity in order to maintain the price for raw materials low enough and thus increase the benefits and utilities received by cassava growers in the region.

More details on cassava drying for use as animal feed can be obtained in the regional offices of ERI (Integrated Rural Development Agency) in the Atlantic Coast.

Table 1. Labor requirements to dry a 50-ton batch of fresh cassava.

Operation	Number of workers	Number of hours	Man-hour
Weighing and chipping	4	3.0	12 0
Spreading	3	3.0	9 0
Turning over	1	3.0	3 0
Gathering, packaging, and storing	5	1	5 0
		Total	48 0

Table 2. Investments for a natural cassava drying plant. Drying area: 500 m².

Concept	Unit Price (US\$)	Partial cost (US\$)	Total cost (US\$)
A. FACILITIES			4,700
Concrete floor, m ²	7.40/m ²	3,700	
Storehouse 140 m ²	5.00/m ²	800	
Wire fence, m	1.00/m	100	
B. EQUIPMENT			1,700
Cnipping machine	880	880	
2 gasoline engines (8 HP)	500	500	
1 scale (500 kg capacity)	230	230	
C. TOOLS			800
3 wheelbarrows	40.00	120	
6 metallic shovels	4.00	24	
10 wooden hoes	2.00	20	
10 wooden collectors	1.00	10	
Hemp sacks		250	
1 plastic tent		250	
SUB-TOTAL			7,240
Contingencies (5%)			370
Working capital			<u>2,300</u>
TOTAL			<u>10,010</u>
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