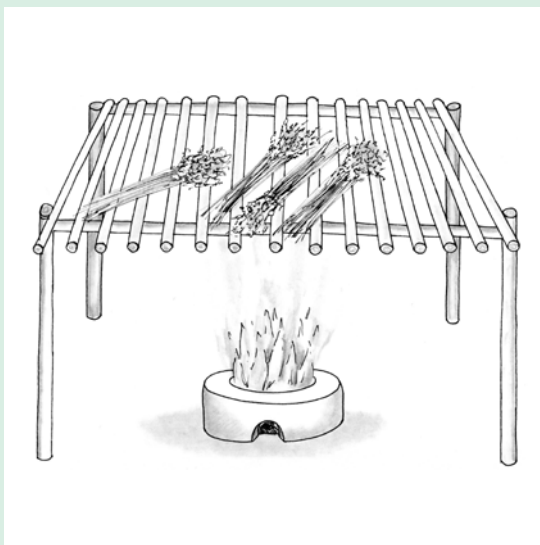


Storage of agricultural products



Agrodok 31

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products**

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Foreword

This booklet in the Agrodok series is a major revision of Jelle Hayma's edition from 1995. As post-harvest losses of crops are still a major issue for small-scale farmers in the tropics, we needed no further stimulation to work on the update.

The intention of this revision was to place less emphasis on all the technical facilities available to store agricultural products, and instead provide more background information on how and why products deteriorate, and how this can be delayed or reduced.

Rather than focusing only on storage of the most important staple foods (grains and pulses, root and tuber crops), a whole chapter in this edition has been devoted to fruits and vegetables. These products are not only important in the diet of a farmer's family: they can also contribute to the farmer's income when brought to the market in good condition.

During the preparation of this booklet we received comments from several people on how to improve the manuscript. We want to acknowledge especially the valuable input of Dr. Peter Fellows, who was simultaneously in the process of writing *Agrodok 50: Packaging of Agricultural Products*.

The authors, Wageningen, 2011

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1 Introduction

1.1 Reasons for a farmer to store agricultural products

This booklet discusses how agricultural products are harvested and stored by farmers. In most cases, the products are stored without further handling for a shorter or longer period. Unfortunately losses of 25 percent for stored grain crops and 40-50 percent for vegetables are not unusual in the tropics. For the farmers, these products fulfil various needs:

Seed for planting

Part of the harvest is used as propagation material for the next crop. If seeds or tubers are not stored well, some will not germinate (grow) when planted, which means the farmer will have to plant many more to get enough plants. The seed grains may also grow at different speeds, which will cause problems for cultivating and harvesting the crop.

Food for the family

It is important to have enough food, but to stay healthy it is also important to have food that is of good quality. Farmers and their families can clearly see whether they will run out of grain to eat before the next harvest, but loss of food quality is more difficult to measure. Some insects eat out the best parts of the grain, which contain the vitamins and minerals that make the food nutritious. Farmers may not see this loss, and therefore need to know how to prevent it. Lack of nutritious food can lead to many problems, including sickness and malnutrition.

Income

Farmers have to buy or barter for things they need but do not produce themselves. Most farmers sell the products they do not use for food or planting to earn money, or they trade their own products for the things they need. If farmers have only poor drying and storage facilities, they cannot keep their products safely for any period of time and are forced

to sell the products soon after harvest. The prices are low at this time because no one needs grain. Everyone is harvesting, and there is plenty of grain available. If the farmers can dry and store the products safely, they may be encouraged to grow more than they need for their families. Good grain storage can thus lead to more food, more money, better planting material, and a better future.

With this practical manual we wish to encourage small-scale farmers to improve their storage methods for grains, roots and tubers, fruits and vegetables.

1.2 Outline of the booklet

In this booklet we discuss the storage of different agricultural products. We will present storage not as a single measure, but in the context of other post-harvest activities. In the first chapter we discuss why it is important for farmers to store agricultural products.

Chapter 2 is divided into several sections. The first section (2.1) discusses how agricultural products start to deteriorate after harvesting, which makes them unsuitable for long-term storage. The maximum storage period varies per product, but in general it is longest for seeds, intermediate for most roots and tubers and shortest for some fruits and vegetables. Section 2.2 explains why the quality of harvested products quickly declines. Section 2.3 describes ways to stop or reduce these losses. Section 2.4 summarises the principles for product storage and how these can depend on the type of products to be stored and the outside conditions.

Chapters 3 – 5 are devoted to the storage of specific crops, including seeds (Chapter 3), roots, tubers and bulbs (Chapter 4) and fruits and vegetables (Chapter 5). These chapters start with an overview of the products that belong to each group of crops discussed, followed by the greatest challenges in storing these products. The third section of each chapter describes the activities that take place in the field before storage, and for some products storage in the field. The fourth section of

each chapter is devoted to preparation of storage space inside a building, the storage itself and transport to and from the storage space.