Agrodok-series No. 37

Small-scale seed production

with variety improvement of cereals and pulses

CTA

partageons les connaissances au profit des communautés rurales

sharing knowledge, improving rural livelihoods

Agrodok 37

Small-scale seed production

with variety improvement of cereals and pulses

Harry van den Burg

This publication is sponsored by: KERKINACTIE
KERKINACTIE attaches high priority to rural development in its work, and supports organizations active in this field. Agriculture and food production are activities of vital importance in rural areas. KERKINACTIE supports this kind of work directly and also indirectly providing support for the collection, compilation and spread of information and knowledge.

First edition: 2004

Author: Harry van den Burg
Editor: Edwin Nuijten
Illustrator: Barbera Oranje
Design: Eva Kok
Translation: Catharina de Kat-Reynen
Printed by: Digigrafi, Wageningen, the Netherlands

ISBN Agromisa: 90-77073-43-4

Foreword

Seed production and the maintenance of crop cultivars by small farmers is a subject that has attracted increasing attention over the past decade. The increasing dominance of large multinationals in the seed trade, the controversy over genetic engineering, and the recognition of farmers' rights over cultivars developed by them over the course of many years have all highlighted the importance of the maintenance of farmer capacity and capability in seed production.

This Agrodok hopes to contribute to the skills and references at the farmer's disposal. It has been written with frontline extension staff and skilled small-scale farmers in mind. It deals with the general principles and practices of cultivar maintenance and seed production, and makes reference to specific issues regarding cereal and legume seeds. It is hoped that follow-up booklets will deal with specific requirements of other important crop groups.

The author would like to thank Niels Louwaars for his constructive comments, and Conny Almekinders and Roy Keijzer for help with references and addresses and encouragement throughout. For the illustrations many thanks are due to Barbera Oranje.

And last, but not the least, Agromisa would like to thank KERKINAKTIE for the financial support that made the realization of this publication possible.

Harry van den Burg

Contents

1 Introduction

1.1 Reasons for producing one's own seed

Keeping seed from one's own crop was standard practice for farmers throughout nearly the whole history of agriculture. Swapping or passing on new types of seed between farmers must have been common, but only in the case of crop failure or other disasters would farmers have obtained all their seed from others. Occasionally, someone may have found a plant type that was better than the one normally cultivated, and some farmers may have been better at producing good seed than others. From these very early differences the modern seed industry slowly developed.

Nowadays, most technologically advanced farmers buy their seed every year. They recognize that specialized seed companies offer better quality seed of new, continually improved, cultivars than what they can produce themselves. The cost is more than offset by the benefits that they obtain.

But in many countries there is no modern seed industry. Or, if there is one, it concentrates only on certain areas in the country, or on certain, mostly richer, groups of farmers. It is also common for modern seed companies to concentrate on only certain crops, for which there is a steady, large market, and not on small crops with fluctuating market sizes. The *cultivars* (varieties) that these companies produce are often also only suitable for certain groups of farmers. The seed may be expensive, it may be hybrid (this often goes together), or the cultivars may not have the characteristics that the smaller farmers are looking for.

These are all good reasons for why farmers may want to keep their own seed. This booklet is meant to assist farmers and extension workers in applying the right methods to obtain the best possible seed qual-

ity. It explains the principles of seed production and indicates methods that can be used by resource-poor farmers.

Because of the history of on-farm seed production, there may well be individual farmers who have developed their own, different methods of seed production. These can be very valuable when developing locally adapted methods. By checking them against the general principles explained here, it will become clear whether and how they promote the same result: good quality seed of the right variety.

Likewise, the products of the formal, modern seed industry are not necessarily always wrong for the small farmer. The physical seed quality is often excellent, in most cases assisted by official certification schemes. The cultivars are designed to meet the demands of buyers other than the small farmer, but sometimes, quite by chance, these cultivars have characteristics that are of interest to the small farmer as well. It is therefore always wise to keep an eye on what the formal sector offers, and to try out what might look promising.

1.2 Seed production and cultivar development

Producing seed should always go hand in hand with *selection*, with choosing the best and discarding the worst. This can very easily have an impact on the characteristics of the cultivars, on the way they look and perform from year to year. The identity of cultivars may slowly change over time. This is in fact how our cultivars, and even our crops, have come to look the way they do now, starting thousands of years ago with plants taken from the wild. The farmer who wants to keep his or her own seed must bear this in mind. It is one thing to want to keep a cultivar the way it is, but improving it or developing new cultivars out of it is something else.

In the formal seed industry it is very important to maintain the identity of a cultivar, and official certification schemes are strictly applied for this purpose. This is because the buyers of the seed and of the end product want to know exactly what they are getting. If the buyer is a

processor of potatoes for instance, it is essential that the processing characteristics of the cultivar do not change, otherwise his chips or potato flour will not look or taste the same. It is also important because other seed companies may have a very similar cultivar. By allowing a cultivar to change, it may 'turn into' somebody else's, and rules of ownership may be infringed.

The small farmer who produces seed for his own use does not need to worry about all that. In fact, he most likely will be actively looking to improve his cultivar all the time. But the situation changes if he chooses to sell some of the seed. An improvement for one farmer may be a disadvantage for a buyer who farms in a different area, or for a different purpose. It is important to always be aware of what the user of the seed is looking for. In such cases, it is often better to have separate fields for the maintenance of the cultivar and for trying out new improvements. We will look separately at the methods for producing seed and at those for improving cultivars.

1.3 Open-pollinated versus hybrid cultivars

Nowadays, for certain crops, modern seed companies market mostly *hybrid* seeds. Among the crops we deal with in this booklet, this practice applies mostly to maize and sorghum. Hybrid cultivars are made by planting two cultivars in the same field, allowing only one parent (the male parent) to produce pollen, and harvesting the seed only from the other (the female) parent. If the parents are chosen correctly, the offspring (the hybrid cultivar) will perform much better than the average of the parents, or even better than each of the parents. This is called *heterosis*, or hybrid vigour.

It is very difficult and time-consuming to develop and choose just the right parents, who together will produce the maximum hybrid vigour. This is why the seed is expensive. It is also very difficult to copy a hybrid. If the farmer keeps and plants seed from the harvest of a hybrid, the (worse performing) parent types will appear again among the following year's crop, and most of the hybrid vigour will be lost. Hy-

brid seed production is a job for professionals, and we will not deal with it in this booklet.

Farmers who keep their own seed normally work with non-hybrid or *open pollinated (OP)* cultivars. The plants are allowed to pollinate freely, and seed can be harvested from all plants. The only exception to this rule involves certain selection methods used in cultivar improvement, which will be described later.