BR1: An Improved Bruchid-Resistant Cowpea Variety for Northern Cameroon

CRSP 

Technical Bulletin 4

Agronomic Research Institute of Cameroon (IRA)
Maroua Research Center
CRSP Cowpea Storage Project

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INTRODUCTION

Callosobruchus maculatus, the cowpea weevil or cowpea bruchid, is the principal storage pest of cowpea in northern Cameroon. Infestations start in the field on pods but population growth accelerates following threshing when eggs can be laid directly on the seeds.

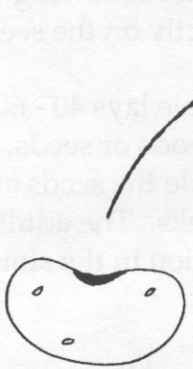
The adults live 5 - 10 days. Each female lays 40 - 60 eggs which she glues to the cowpea pods or seeds. Bruchid larvae feed and develop inside the seeds and emerge as adults after about 3 - 4 weeks. The adults mate and give rise to another generation in the store. The cycle is repeated again and again.

Since each female lays so many eggs and there are multiple generations, even minor infestations at harvest can lead to almost total loss of the cowpea store after only a few months of storage.

Life Cycle of the Cowpea Bruchid

Callosobruchus maculatus

The life cycle of the bruchid is composed of four stages: egg, larva, pupa, and adult. The complete life cycle takes about 5 weeks.

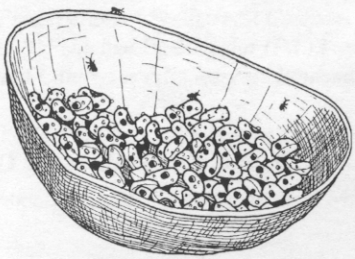


Egg (duration: 7 days)
40 to 60 eggs which hatch in about 7 days are laid on pods or directly on the seeds.

Larva (duration: 14 days)
Larvae feed and develop inside the seeds.

Pupa (duration: 7 days)

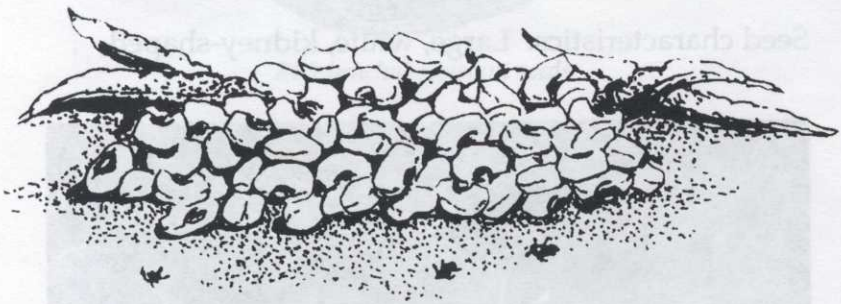
Adult (duration: 7 days)
Adults emerge from the seeds.



BR1: A Cowpea Bruchid-Resistant Variety

The IRA/CRSP cowpea storage project currently recommends the variety BR1 to cowpea producers in northern Cameroon to help reduce losses to the cowpea bruchid during storage.

BR1 exhibits resistance to the cowpea bruchid. Because of genetic factors in the plant BR1 resists bruchid attacks, thereby reducing losses during storage.



The purpose of this bulletin is to describe the cowpea bruchid-resistance characteristics of BR1 and explain the advantages to be expected by growing and storing this variety.

Agronomic Characteristics

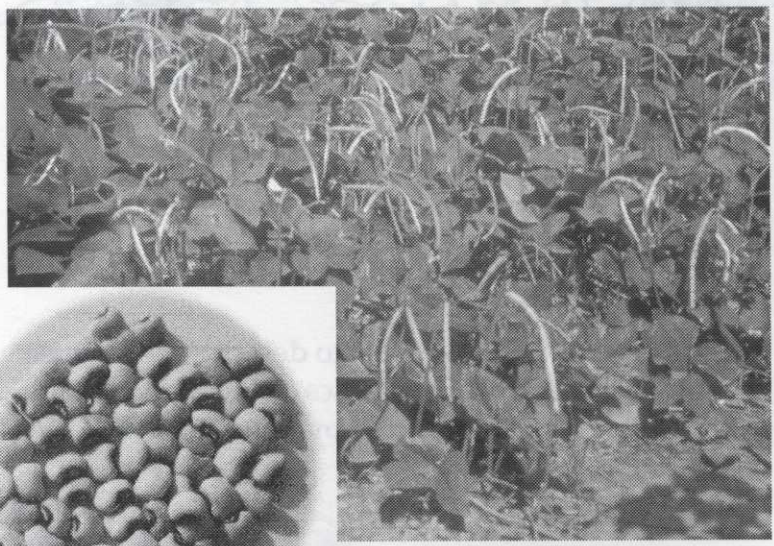
BR1 ("Bruchid Resistant 1") is a large white-seeded cowpea variety which has broad adaptation in northern Cameroon. BR1 was developed at the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria where it is known as breeding line IT81D-985.

Yield potential: 1000 kg/ha

Maturity: 75 - 80 days

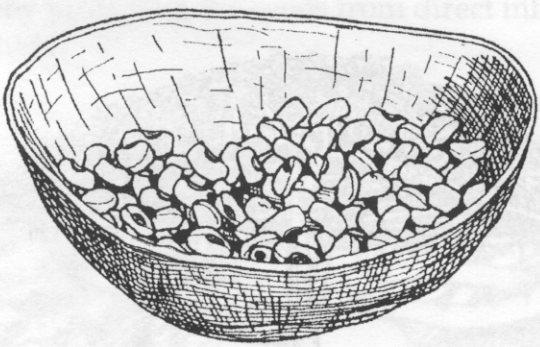
Growth habit: Semi-erect, semi-determinant

Seed characteristics: Large, white, kidney-shaped



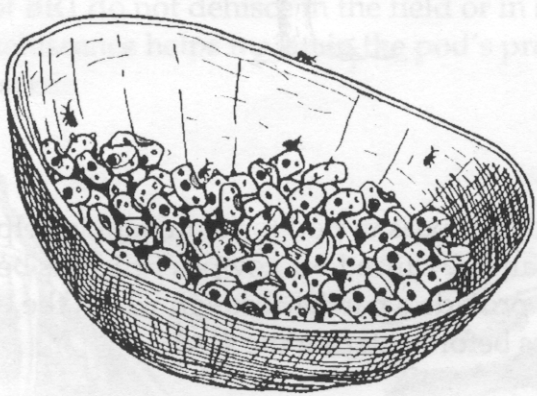
Seed Resistance

The seeds of BR1 have resistance factors present which cause cowpea bruchids to either die or develop more slowly than in non-resistant seeds.



BR1 bruchid-resistant seeds

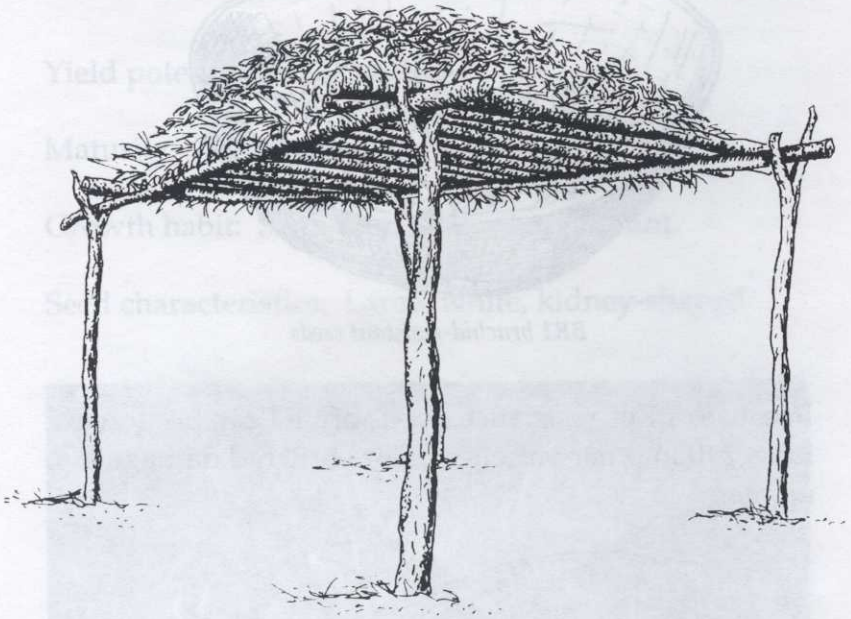
Because of this resistance, seeds of BR1 can be stored longer than other varieties before bruchid damage appears.



Seeds of bruchid-susceptible variety

Pod Resistance

In northern Cameroon, the majority of cowpea producers store their cowpeas in pod form on dankis for some period of time after harvest.



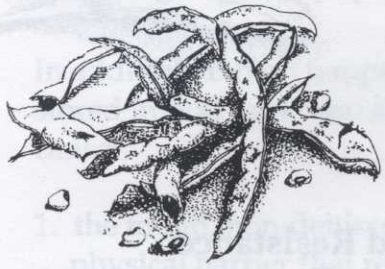
Storage of cowpeas in pod form on dankis helps to reduce damage caused by cowpea bruchids because the pods provide a barrier through which the bruchids must pass before entering the seeds.

Pod characteristics of BR1 help reduce losses to the cowpea bruchid:

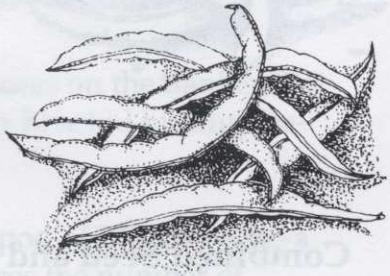
Breakage resistance:

BR1 possesses tough pods which are resistant to breakage and remain intact during harvest and storage, thereby protecting the seeds from direct infestation by bruchids.

Breakage-susceptible



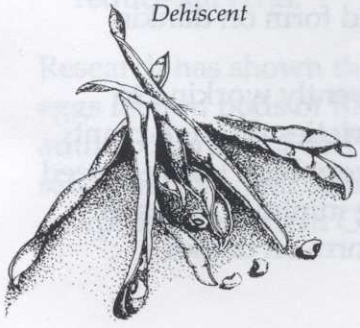
Breakage-resistant



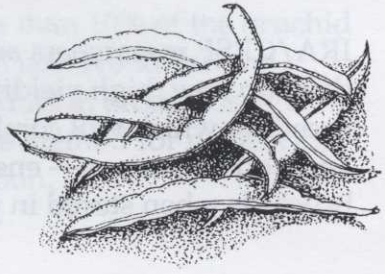
Non-dehiscence:

Pods of BR1 do not dehisce in the field or in storage. Non-dehiscence helps maintain the pod's protection of the seeds.

Dehiscent

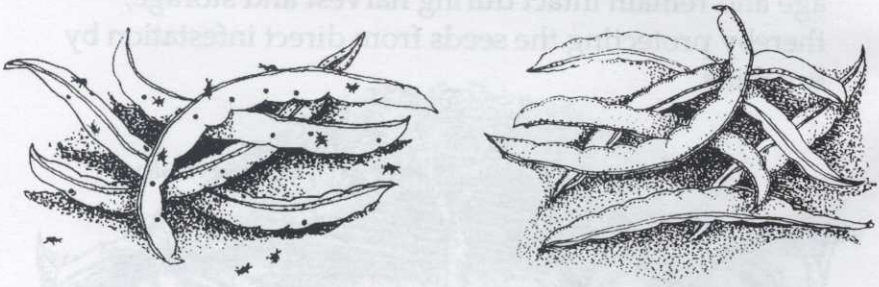


Non-dehiscent



Pod resistance:

BR1 possesses a moderate degree of pod resistance. Nearly 80% of the bruchids which hatch on pods of BR1 are killed while chewing through the pods.



Combined Seed and Pod Resistance

Maximum cowpea bruchid protection can be achieved by using varieties which possess both seed and pod resistance.

Laboratory and field tests have shown that BR1 possesses a limited degree of combined seed and pod resistance, which will significantly decrease damage by bruchids when stored in pod form on dankis.

IRA/CRSP researchers are currently working to develop new, high yielding varieties through plant breeding which will combine very high levels of seed and pod resistance — ensuring minimal losses to bruchids when stored in pod form on dankis.

Storage of BR1 in Pod Form

The IRA/CRSP storage project encourages the traditional practice of storing cowpeas in pod form on dankis after harvest, and recommends the use of variety BR1 for this purpose.

To store variety BR1 in pod form, the use of a storage danki, placed in full sunlight is recommended. The high temperatures attained on dankis in full sunlight discourage bruchid population buildup.

In addition to high temperatures on the dankis, BR1 stored in pod form also limits bruchid buildup because:

1. the tough, non-dehiscent pod of BR1 provides a physical barrier that reduces the number of bruchids that can successfully infest the seeds.

2. pods of BR1 possess resistance factors

3. larvae which are able to penetrate the pods and establish in seeds are confronted with seed-resistance factors which delay development and further reduce survival.

Research has shown that less than 10% of the bruchid eggs laid on pods of BR1 will survive to become adults. Storage of BR1 in pod form on dankis is a safe, effective, and affordable method for preserving cowpeas in northern Cameroon.

Acknowledgments:

Illustrations by Russ Merzdorf

Original release of IITA line IT81D-985 by Dr. B.B. Singh, IITA