

Airtight Storage of Cowpea in Triple Plastic Bags (Triple-Bagging)



Technical Bulletin 3

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

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This research was carried out by IRA and Purdue University scientists as part of the Bean/Cowpea Collaborative Research Support Program (CRSP) project: Preservation of Postharvest Cowpeas by Low-Resource Farmers in Cameroon, U.S. Principal Investigator (P.I.) Larry L. Murdock, U.S. Co. P.I. Richard E. Shade, and Cameroon P.I. Zachée Boli.

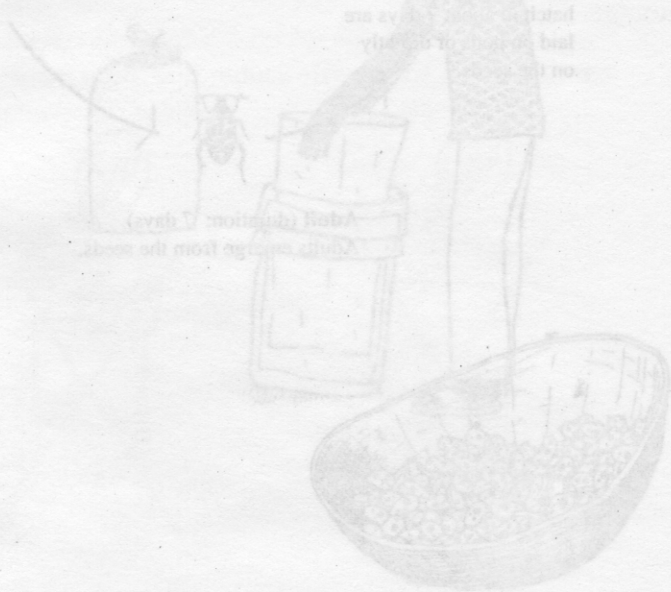
The Bean/Cowpea Collaborative Research Support Program is funded by the U.S. Agency for International Development Grant No. DAN-1310-G-SS-6008-00 which is implemented by Michigan State University.

INTRODUCTION

Callosobruchus maculatus, the cowpea weevil or cowpea bruchid, is the principal storage pest of cowpeas 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 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.

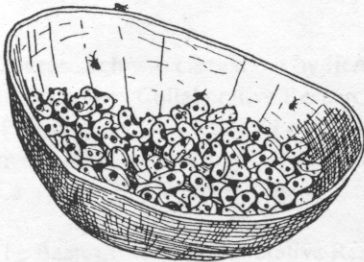
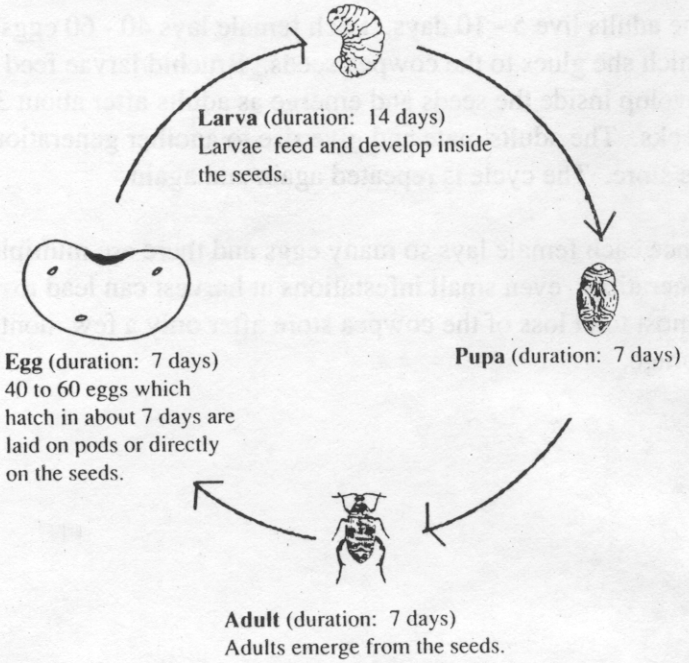
Since each female lays so many eggs and there are multiple generations, even small infestations at harvest can lead to almost total loss of the cowpea store after only a few months of storage.



Life Cycle of the Cowpea Bruchid

Callosobruchus maculatus

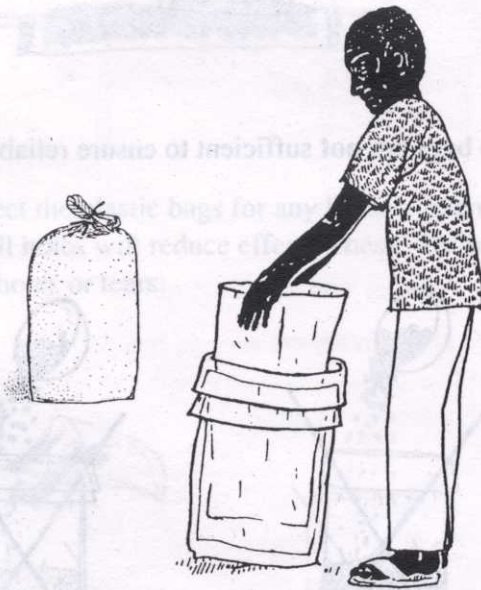
The life cycle of the bruchid is composed of four stages: egg, larva, pupa, and adult. The life cycle is completed in about 5 weeks.



Bruchids can't live without air

The cowpea bruchid *Callosobruchus maculatus* can't live without air to breathe, therefore, storage in airtight containers is an effective way to eliminate bruchid populations in stored cowpeas.

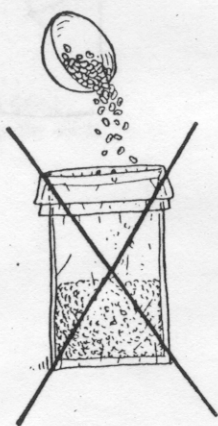
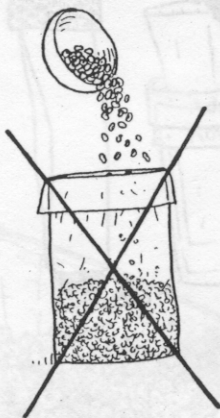
Clear plastic bags capable of holding 50 kgs of cowpeas are cheap and readily available in northern Cameroon. If properly used, they can serve as effective airtight containers.



IRA/CRSP researchers have shown that by using **three** of these 50 kg capacity plastic bags, placed one inside the other, effective airtight conditions can be achieved.



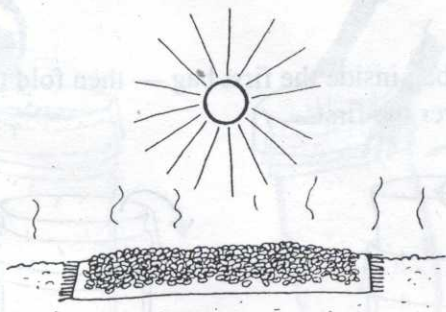
One or two bags are **not** sufficient to ensure reliable airtight storage.



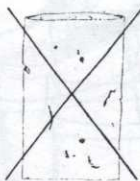
Procedure

The following procedure, utilizing the 50 kg clear plastic bags available in Maroua, is referred to as “triple bagging” and is recommended by the IRA/CRSP cowpea storage project.

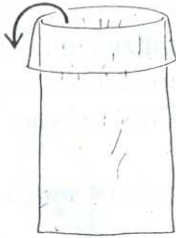
Thoroughly dry the cowpeas to be stored.



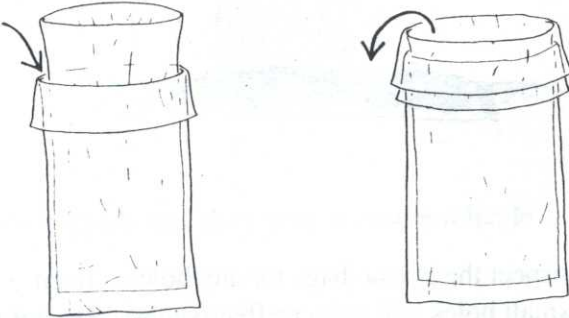
Carefully inspect the plastic bags for any holes. Even extremely small holes will reduce effectiveness. **Do not use** any bags with holes or tears.



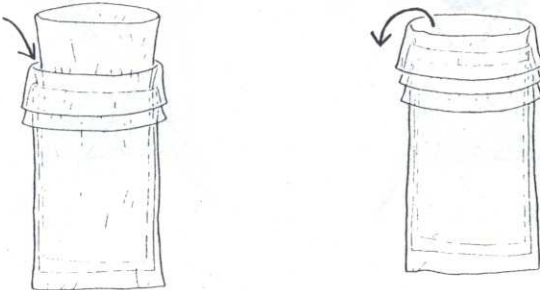
Fold back the top of the first bag.



Place the second bag inside the first bag — then fold the top of the second bag over the first.



Place the third bag inside the second bag and fold the top down over the first two bags so that cowpeas can be easily poured into the third, inner-most bag.



Slowly fill the inner-most bag with cowpeas, being careful to shift or rock the bags frequently to eliminate air spaces. Fill the inner-most bag nearly to capacity, leaving only enough room for the plastic bags to be tightly drawn together, folded back on themselves, and tied.

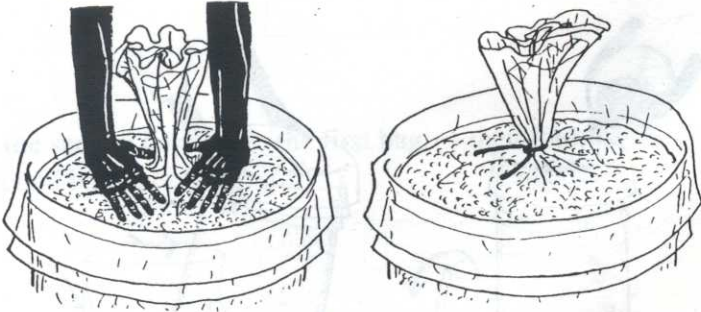


Repeat this type procedure individually for each of the 3

Firmly draw together the top plastic of the inner-most bag, squeezing tightly to press air out. Gently rock the bagful of cowpeas back and forth to help eliminate any air spaces.



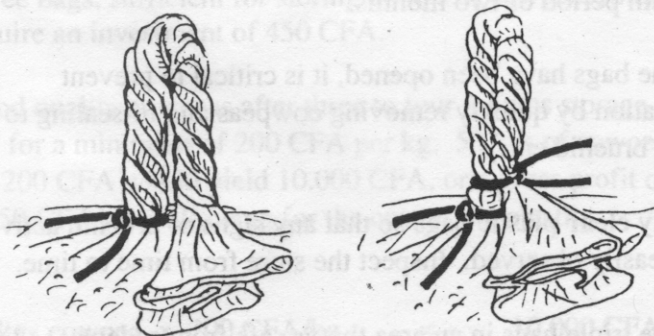
After the cowpeas are well settled in place, squeeze the top plastic of the inner-most bag to force out any air and tie the bag closed with string or cord.



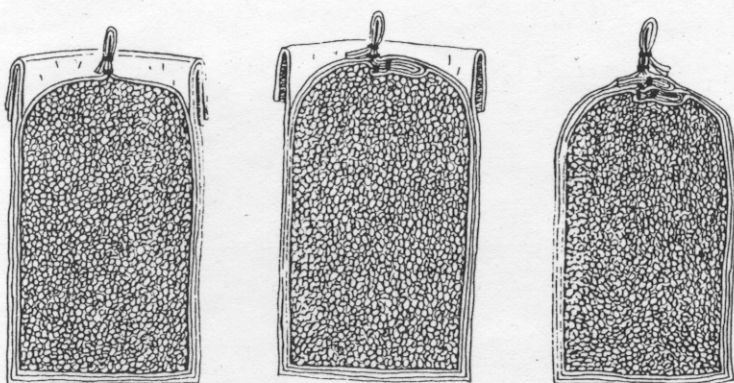
Twist up the remaining plastic above the tie and fold this back on itself.



Firmly tie the double-folded plastic together.



Repeat this tying procedure individually for each of the 3 plastic bags.



Precautions

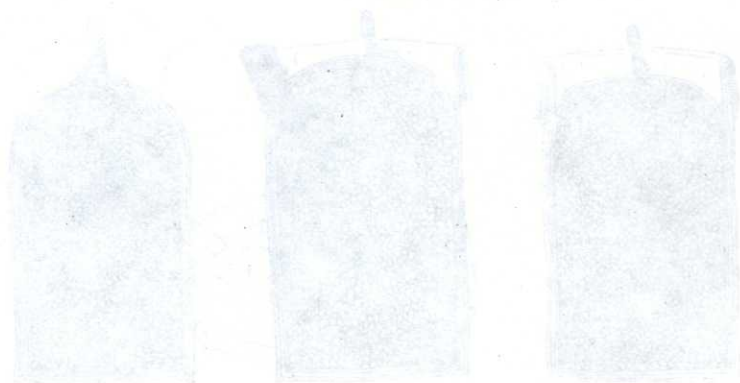
This storage method is intended for mid-to long-term storage. It is recommended that the triple bags remain sealed for a minimum period of two months.

After the bags have been opened, it is critical to prevent reinfestation by quickly removing cowpeas and re-sealing to prevent bruchid entry.

Use only **clear** plastic bags so that any signs of bruchid activity can be easily observed. Inspect the store from time to time.

Store the triple bags in an area that is safe from rodents. Rodents can chew through the plastic, allowing air and bruchids to enter the container.

Airtight storage in triple plastic bags is: **easy to use**
effective
safe



Cost / Benefits

The 50 kg capacity clear plastic bags described in this bulletin are sold in the Maroua central market for 150 CFA apiece. Three bags, sufficient for storing 50 kgs of cowpeas, therefore require an investment of 450 CFA.

Good quality cowpeas after three to four months storage will sell for a minimum of 200 CFA per kg. 50 kgs of cowpea sold for 200 CFA would yield 10.000 CFA, or a gross profit of 9.550 CFA after allowing for the cost of the plastic.

50 kgs cowpea x 200 CFA/kg	=	10.000 CFA
3 clear plastic bags x 150 CFA	= (-)	<u>450 CFA</u>
Gross Profit	=	9.550 CFA

Acknowledgements:

The authors gratefully acknowledge the earlier work of Dr. Moffi Ta'Ama with "double bagging," which stimulated the research described herein.

Illustrations by Katy Russell and John K. Miller.

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