

Creating artificial beans for bean beetles, *Callosobruchus maculatus*, using a mechanical pill press

L.S. Blumer and W. C. Whitfield

Morehouse College, Department of Biology, 830 Westview Dr. SW, Atlanta, GA, 30314, USA

(lawrence.blumer@morehouse.edu)

The bean beetle, *Callosobruchus maculatus* (Coleoptera, Chrysomelidae), has become a widely used insect species in undergraduate laboratory education. This species is particularly suitable for course-based undergraduate research experiences (CUREs) due to its short generation time, ease of handling and culturing in the laboratory, and sexual dimorphism in its sedentary phase. Bean beetles complete their growth and development inside a host seed (bean) with at least eight different host species. However, conducting manipulative experiments with bean beetles would be enhanced if it were possible to readily prepare artificial beans on which the beetles could complete their lifecycle. Here, we report on the use of a mechanical pill press (LFA Machines Model TDP-0) to make artificial beans. We prepared artificial beans by making whole blackeye pea flour (*Vigna unguiculata*) using a coffee grinder. That flour was used in the pill press to make 8mm diameter x 5-9mm thick disk-shaped pills with and without additives. Adult female bean beetles readily laid fertilized eggs on the surface of these artificial beans. Offspring emerged 4-5 weeks later at 25°C, the same development time that would have occurred in natural intact blackeye pea seeds. No special treatments of the artificial beans were required to induce females to lay eggs on them nor for the pills to remain intact during the period of larval and pupal development. This mechanical pill press can produce 30-50 pills per minute, so artificial beans can be produced rapidly in sufficient numbers to conduct meaningful experiments. This simple and effective method for making artificial beans creates the opportunity to conduct studies that have been difficult or impossible in the past. For example, future studies may evaluate treatments such as plant secondary compound concentrations, nutrient content, and antibiotic exposure on bean beetle life history and microbiome communities.

Keywords: Bean beetle, artificial beans, CURE, ecology

Link To Original Poster File: <https://doi.org/10.37590/able.v43.poster41>

Mission, Review Process & Disclaimer

The Association for Biology Laboratory Education (ABLE) was founded in 1979 to promote information exchange among university and college educators actively concerned with teaching biology in a laboratory setting. The focus of ABLE is to improve the undergraduate biology laboratory experience by promoting the development and dissemination of interesting, innovative, and reliable laboratory exercises. For more information about ABLE, please visit <http://www.ableweb.org/>.

Papers published in *Advances in Biology Laboratory Education: Peer-Reviewed Publication of the Conference of the Association for Biology Laboratory Education* are evaluated and selected by a committee prior to presentation at the conference, peer-reviewed by participants at the conference, and edited by members of the ABLE Editorial Board.

Citing This Article

Blumer LS and Whitfield WC. 2023. Creating artificial beans for bean beetles, *Callosobruchus maculatus*, using a mechanical pill press. Abstract 41 In: Boone E and Thuecks S, eds. *Advances in biology laboratory education*. Volume 43. Publication of the 43rd Conference of the Association for Biology Laboratory Education (ABLE). <https://doi.org/10.37590/able.v43.abs41>

Compilation © 2023 by the Association for Biology Laboratory Education, ISSN 2769-1810. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright owner. ABLE strongly encourages individuals to use the exercises in this volume in their teaching program. If this exercise is used solely at one's own institution with no intent for profit, it is excluded from the preceding copyright restriction, unless otherwise noted on the copyright notice of the individual chapter in this volume. Proper credit to this publication must be included in your laboratory outline for each use; a sample citation is given above.