

# A Multicylinder 2-5 Grams per Sample Oilseed Press Cell<sup>1</sup>

## ABSTRACT

A six cylinder 2-5 g per sample oil seed press is described which improves oil sample quality with no cross contamination, reduces extraction time per sample, and can be fitted into a Carver B Laboratory Press.

## INTRODUCTION

The determination of oil quality in both existing and potential oilseed crops requires large numbers of oil extractions. Traditional methods are solvent extraction or individual pressure extraction using the Carver Press cylinder or its equivalent.

A multicylinder press cell was designed to facilitate the extraction of small quantities of oil for qualitative determinations from various types of oilseeds. The primary requirement of such a cell was the rapid extraction of clear oil, free of cross contamination.

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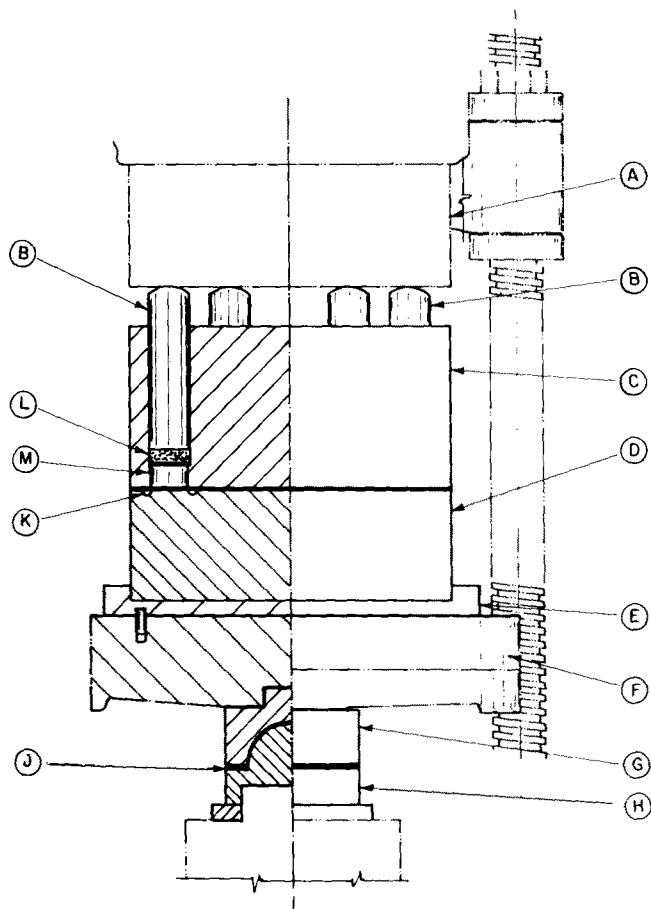


FIG. 1. Schematic of multicylinder press cell in Carver Press: A. Carver Press, top platen; B. piston; C. cell, top platen; D. cell, bottom platen; E. cell, locating plate and guide; F. Carver Press, bottom platen; G. hemispherical bearing, female; H. hemispherical bearing, male; J. .15 mm clearance; K. oil trough cell, lower platen; L. sample; M. sample isolation plug.

## MATERIALS AND METHODS

The press cell (Fig. 1) consists of a lower platen (D) with sample collection troughs (K) and platen guide (E), and an upper platen (C) with cylinders (B), sample (L) and sample

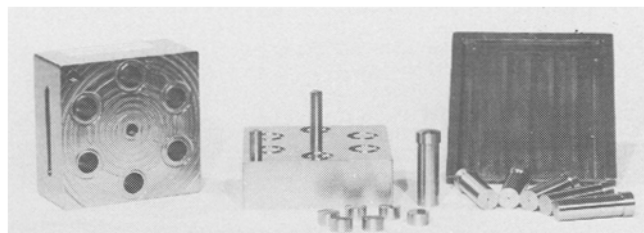


FIG. 2. Seed cell assembly, components from left to right: upper platen lower face, lower platen and platen guide. Foreground sample isolation plugs and pistons.

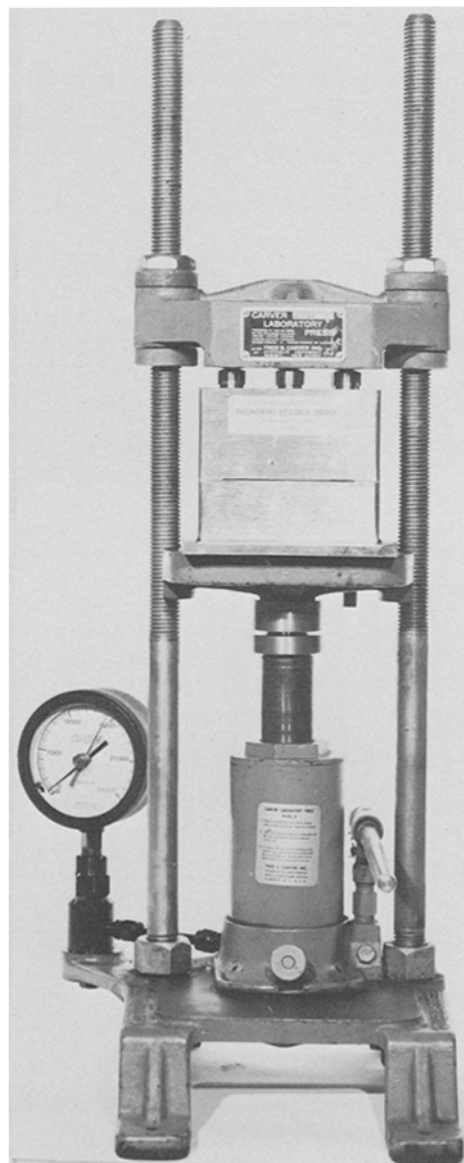


FIG. 3. Carver Press with press cell in position.

TABLE I

Comparison of the Fatty Acid Composition of Various Oilseeds Pressed Individually in a Carver Cylinder and in Combination in the Multicylinder Cell

Seed type and treatment	Fatty acid composition, %									
	Oil classification <sup>a</sup>									
	16:0	16:1	18:0	18:1	18:2	Unknown	18:3	20:1	22:0	22:0
Flax										
Carver cylinder	7.8	---	4.6	20.5	15.3	---	51.8	---	---	---
Multicylinder	6.2	---	5.0	21.6	14.8	---	52.4	---	---	---
Sunflowers										
Carver cylinder	6.6	---	4.3	15.4	73.0	---	0.1	---	0.6	---
Multicylinder	6.2	---	4.4	15.5	73.0	---	0.4	---	0.5	---
Crambe										
Carver cylinder	3.2	0.2	1.0	19.8	11.8	0.6	11.0	1.2	---	51.2
Multicylinder	2.4	0.1	0.8	18.8	11.3	0.6	11.2	1.4	---	53.4
Rapeseed (zero)										
Carver cylinder	4.3	0.3	2.0	60.4	20.0	0.6	11.2	0.5	0.2	0.5
Multicylinder	3.9	0.2	1.7	59.2	20.6	0.4	12.0	0.8	0.1	1.1

<sup>a</sup>Oil classification: first two numbers represent carbon chain length; third number represents the number of double bonds.

isolation plug (M). To facilitate platen alignment in the press a hemispherical bearing assembly (H,G) is fitted over the piston rod.

The cylinder bores are 2.225 cm per bore, and the plugs and pistons have clearances of .005 mm and .010 mm, respectively.

The plug has a larger clearance to facilitate passage of oil to the collecting troughs. To prevent cross contamination of samples between cylinders it was found essential to relieve the lower face of the top platen by .15 mm (Fig. 2) leaving a 3 mm boss at each cylinder bore. To ensure durability both plugs and pistons are of chrome-plated ground tool steel.

In operation (Fig. 1), after washing and drying the platens, pistons and plugs, the upper platen C is placed onto the lower platen D and automatically aligned by the dowels in platen D. The sample isolation plugs are then dropped into position in each bore, followed by a weighed quantity of seed and then by the piston. The platen assembly is then placed in a Carver Model B Laboratory Press and held at 10,000 kg load setting for up to 2 min to allow the oil to be extracted. The platen assembly is then removed from the press and the upper platen separated from the lower. Usually the seed cells remain in the upper platen, and the plugs on the lower platen. The oil samples are then removed from the collecting trough by pipette or capillary tube.

The multicylinder cell was tested by crushing 2 g samples of rapeseed, sunflowers, flax and crambe. The oil was collected and examined visually then stored and reexamined after 1 week. In addition, the fatty acid composition of the oils expressed from the Carver cylinder and the multicylinder was determined by gas liquid

chromatography (GLC) to check for cross contamination.

## RESULTS

The appearance of the oil from the seeds crushed in the Carver Press cylinder without filter pads indicated considerable particulate contamination. The oil obtained from the multicylinder cell had an excellent initial appearance with only slight clouding after 1 week. GLC analysis of oil from the various cells indicated no cross contamination despite the diverse quality characteristics of the seeds crushed (Table I).

This multicylinder cell has been used successfully to express oil for fatty acid, refractive index and color analysis. Presumably it could be used for any routine test requiring small quantities of pure oil.

The multicylinder cell saves more than 50% in operating time to complete six extractions including weighing, assembly, extraction, sampling, disassembly and cleaning, in comparison with the same number of samples in the Carver cylinder (Fig. 3).

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