Here are a few methods that are used to phenotype FAMEs in seed oils. Ideally, I would have a non-destructive method to phenotype a single seed, and be able to grow the seed

**Burke, Knapp, Rieseberg 2005**

They measured two traits: seed oil content, and fatty acid concentrations.

The seed oil content was measured with NMRS without destroying the sample.

“*The oil concentrations of clean, physiologically mature achenes were measured by pulsed nuclear magnetic resonance (NMR) analysis on an Oxford 4000 NMR (Concord, MA). Flat-bottomed sample tubes were filled with achene samples weighing between 0.5 and 1.0 g each. The NMR was calibrated using standards developed from the achenes of low-oil (285.9 g/kg oil) and high-oil (444.5 g/kg oil) recombinant inbred lines (RIL 54 and 75, respectively) developed from the cmsHA89 × ANN1238 mapping population (*[*Burke  et al. 2002*](javascript:;)*).*”

Fatty acid concentrations, i.e. the relative abundance of palmitic, stearic, linoleic, and oleic acids, was measured by extracting the oil from 20 ground seeds, and using a GCMS to measure the concentrations.

“*Fatty acid concentrations were measured by gas chromatography of fatty acid methyl esters. For each individual, samples were prepared by grinding 20 achenes (seeds) in 10 ml of HPLC-grade hexane using a Polytron (Brinkmann Instruments, Westbury, NY). The mixture was allowed to settle for 20–30 min before transferring 0.5 ml of the supernatant to a 16 × 100-mm glass tube. Capped samples were heated for 15 min at 50° in a heat block. The hexane was evaporated under a gentle stream of nitrogen gas before adding 0.1 ml of ethyl ether and 0.1 ml 0.1 m of KOH in methanol and heating the samples for 5 min at 50°. The transesterification reaction was neutralized by adding 0.1 ml of 0.15 m HCl to each tube, followed by 2.0 ml of hexane. Samples were then mixed by swirling and allowed to settle. Using a disposable glass Pasteur pipette, 0.5 ml of the upper phase (hexane) was transferred to a gas chromatography vial and capped. We injected 1.0-μl samples onto an Agilent Technologies (Palo Alto, CA) DB-23 micrometer column mounted in an HP6890 gas chromatograph (Hewlett-Packard, Wilmington, DE) using a split ratio of 1:80. The initial oven temperature was 50°. Oven temperatures were ramped up from an initial temperature of 50° to 185° in 30°/min increments and held at 185° for 4.5 min. Total run time was 10 min. Fatty acid concentrations were calculated using ChemStation software (Agilent Technologies). Palmitic, stearic, oleic, and linoleic acid peaks were identified using standards purchased from NU-CHEK PREP Prep (Elysian, MN).”*

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“*Methyl esters of fatty acids were analyzed by Gas Chromatograph Hewlett Packard 6890 with a fire lionization detector and a capillary column HP-INNOWax (Crosslinked Polyethylene Glycol), of 0.32 mm x 30 m x 0.5 mm thick film.”*