

## PLANT MATERIALS TECHNICAL NOTE

### SMALL-SEEDED FAVA BEAN AS CASH CROP AND WITHIN COVER CROP MIXTURE

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Fig. 1. Arvika forage pea seed (left), and small-seeded fava bean (right). Photo: NRCS

#### INTRODUCTION

This technical note summarizes research findings detailed in [Small-Seeded Fava Bean as Cash Crop and Within Cover Crop Mixture, Final Study Report MT-16-005](#).

Pulse crops are commonly grown in Montana for grain and as cover crops, including pea, lentil, and chickpea. Studies have shown that fava (*Vicia faba*) fixes the most nitrogen of all cool-season annual legumes. However, adoption of this crop in Montana has not occurred because most fava bean varieties are too large to fit through modern grain drills, and fava usually grows best in higher precipitation regimes (16 inch/year). Recently, Montana State University isolated a small-seeded accession (PI222216) of fava bean (average 261 mg/seed) capable of fitting through modern grain drills (Fig. 1). We investigated how this small-seeded fava bean accession would perform for both grain production and in a multi-species cover crop mixture. Specifically, we compared fava bean performance with spring forage pea (*Pisum sativum* L. var. Arvika), a common legume grown in Montana.

#### STUDY DESIGN

This replicated study was located at the USDA-NRCS Bridger Plant Materials Center in Bridger, MT. The study consisted of two different planting dates and moisture regimes: spring planting without irrigation and late-summer planting with irrigation. The spring planting on April 4, 2016 consisted of six treatments, including fava and pea grown in monoculture for both forage and grain, and in a four-species cover crop mixture consisting of triticale, safflower, forage kale, and either fava bean or forage pea. The late-summer planting on August 17, 2016 consisted of the same treatments minus the two grain production treatments. The late-summer timing mimicked a shoulder season planting following small grain harvest with possible late-fall grazing. All treatments had a plant population of 11 plants/ft<sup>2</sup>. Each species in the cover crop mix was 25% of the total mix by seed number.

## RESULTS



Fig. 2. Biomass harvest of irrigated treatments, November 9, 2016. Photo: NRCS

In the spring (dryland) planting, there was no significant difference between single-species forage pea (1695 lb/ac) and fava bean (1338 lb/ac) biomass. In contrast, seed production by weight was greater for fava bean (1110 lb/ac) than forage pea (418 lb/ac), indicating greater potential feed production of fava bean than forage pea under similar growing conditions. Both mixed cover crop treatments produced greater biomass than the single-species treatments, likely due to a late harvest (June 24, 2016) that included seed heads and pods from both triticale and legume species.

Biomass production did not significantly differ among all four treatments in the late-summer (irrigated) portion of the study, as all species remained in their vegetative state (Fig 2). Single-species fava bean produced 2409 lb/ac, single-species forage pea produced 2587 lb/ac, mixed-species fava bean produced 3658 lb/ac, and mixed-species forage pea produced 3569 lb/ac.

Results from this study indicate that fava bean produces comparable biomass to forage pea when grown as a single-species or mixed-species cover crop in both dryland and irrigated conditions. Differences in forage quality between fava bean and forage pea are unknown. Production cost differences are difficult to estimate as small-seeded fava bean is currently not commercially available in Montana. Fava bean forage and silage can safely be fed to ruminants and hogs. However, the fava seed should not be fed to chickens and horses, due to potential toxicity issues.

### NRCS APPLICATION

The late-summer irrigated planting is the most likely scenario for Montana farmers as an additional crop to fill the gap after small grain harvest in late July. A mixed-species forage would provide additional grazing for livestock into late fall. Large field sizes and full-size drills are recommended for future study to determine on-farm feasibility once small-seeded fava bean becomes available.

Plant population of 11 plants/ft<sup>2</sup> worked well for both dryland and irrigated scenarios. Assuming a seed size of 261 mg, 85% germination rate, and 90% purity, this accession of fava bean should be seeded at a depth of one inch and a rate of about 360 lbs/ac for a single-species stand. If included in a four-species cover crop mix, it should be seeded at a rate of about 90 lbs/ac, assuming equal composition of species by seed number. Both fava bean and forage pea use *Rhizobium leguminosarum* biovar. *viciae* as an inoculant.

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