Viability of lentil, wheat rotation studied for Rolling Plains

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VERNON – Winter lentils may be just what the doctor ordered to perk up the Rolling Plains wheat crop.

Dr. Emi Kimura checks out early growth stages of lentils near Chillicothe at the Texas A&M AgriLife Research station. (Texas A&M AgriLife photo by Kay Ledbetter)

That doctor is Dr. Emi Kimura, a Texas A&M AgriLife Extension Service agronomist in Vernon.

Lentils are legumes that grow in pods on a bushy plant, and as legumes, they are high in nitrogen, which would benefit the following wheat crop, Kimura said.

She has initiated a winter lentil-winter wheat crop rotation trial with funding provided by Texas Wheat Producers Board to see if this is valuable production option.

While lentil is typically planted in the spring in the Northern Plains, Kimura said concern they might not survive the Rolling Plains summer prompted her to use the fall-sown variety Morton.

From left to right, lentils, canola and wheat were growing in late 2016 as a part of a wheat/lentil rotation trial. (Texas A&M AgriLife photo by Dr. Emi Kimura)

Winter varieties of canola, lentil and wheat were planted on Sept. 30, 2016, in small dryland plots designed with four replications. All crops were planted using the same drill used for wheat at a rate of 60 pounds per acre on wheat, 5 pounds per acre on canola and 25 pounds per acre on lentil.

Kimura said she applied insecticide March 30 as a growing aphid population was observed, especially in canola and a few in winter lentil. No fertilizer or extra water was applied to the plot.

“In our first year, we saw some positive attributes of winter lentil in the Rolling Plains, including excellent winter survival, grain production and forage potential,” she said.

Winter lentil, wheat and canola seed comparison. (Texas A&M AgriLife photo)

Although the winter lentil was slow to fill in the rows in the fall as compared to the wheat and canola, Kimura said the lentil crop did not suffer from cold temperatures during the winter months.

The crops were harvested for grain June 6, and yields were 7.4 bushels per acre for canola, 8.3 bushels per acre for the winter lentil and 39 bushels per acre for winter wheat.

“Our winter lentil yield was lower than expected as compared to the winter lentil yield observed in the Northern Plains,” Kimura said. “We suspect the seeding rate of 25 pounds per acre used in the trial was not appropriate for our region.”

She said seeding rate is an important factor on final yield. To help determine appropriate seeding rates in the Rolling Plains, she conducted a seeding rate trial – 20, 30, 40 and 50 pounds per acre – along with the crop rotation trial during the 2016-2017 growing season.

“We found that a seeding rate at 40 pounds per acre, among the four seeding rates examined, produced the highest yield of 20 bushels per acre,” Kimura said.

This yield is similar to average U.S. lentil yields for the past 10 years, she said. The current seeding cost is $26 per acre with the 40-pounds-per-acre seeding rate.

Lentil forage on June 5 following harvest. (Texas A&M AgriLife photo by Dr. Emi Kimura)

"We do not have a lentil market yet in Texas," Kimura said. "However, if we continue to work on winter lentil production and accumulate enough data, I believe the market will come."

In the past two years, lentil production has gone from about 300,000 acres nationwide to almost 1 million acres in 2016, according to the U.S. Department of Agriculture National Agricultural Statistics Service.

During harvest in 2017, the market prices for these three crops were: lentil, $510-600 per ton or $13.8-16.2 per bushel; canola, $404-475 per ton or $9.16-10.77 per bushel; and wheat, $153-160 per ton or $4.16-4.90 per bushel.

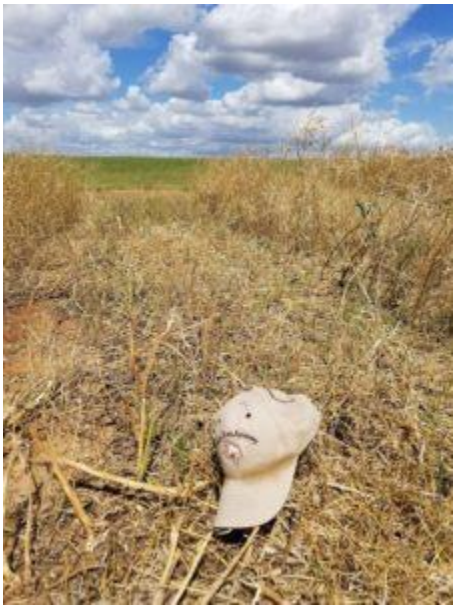
Wheat stubble left after June 5 harvest at the Texas A&M AgriLife Research station near Chillicothe. (Texas A&M AgriLife photo by Dr. Emi Kimura)

She said the lentil crop also produced a harvestable amount of crop residue after combining grain. Crop residues observed for lentil, wheat and canola were 1,154 pounds per acre, 736

pounds per acre and 0 pounds per acre of dry matter, respectively. She said canola leaves hard, woody stubble not suitable for cattle.

“We are currently processing the winter lentil forage samples for nutritive values (e.g., crude protein, neutral detergent fiber, acid detergent fiber, digestibility and relative feed quality),” Kimura said. “These values are all important parameters to influence animal performance such as intake and gain.”

The next phase of this crop rotation study was planted Oct. 12 to assess the influence of winter lentil on winter wheat production, she said. The rotations include wheat following lentil, canola following lentil, wheat behind canola, lentil behind canola, wheat after wheat, lentil after wheat and canola after wheat.



Dr. Emi Kimura said the stalks left behind after canola harvest are hard and woody and not palatable to cattle. (Texas A&M AgriLife photo by Dr. Emi Kimura)

“It has been a very dry fall/winter in the Rolling Plains, and the trial desperately needs moisture, as does all wheat in the Rolling Plains,” Kimura said.

Other production information and best management practices Kimura hopes to determine during these trials include disease and insect information, variety selection, nodulation, planting dates and fertility, she said.

Inclusion of lentil in winter wheat-winter canola rotation systems increased the yield of both wheat and canola and reduced nitrogen requirements for the wheat by about 38 pounds per acre in the Northern Plains, she said.

“We are examining to see whether similar effects will occur to our wheat here in the Rolling Plains,” Kimura said.

She said a 12-year study conducted in Saskatchewan, Canada also indicated the protein contents of wheat were greater in the winter wheat-winter lentil crop rotation systems than continuous wheat production.

Another expected benefit of this rotation, Kimura said, is the nitrogen fertilizer requirement can be gradually reduced compared to the fallow-winter wheat system as a result of increased rate of net nitrogen in the root zone of wheat due to the legume.

“We believe lentil will not only add a beneficial cash crop to the rotation, but it also will greatly contribute to reducing environmental footprints,” Kimura said.
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