yield and weed control. Row spacing treatments in the experiment are 16, 18, 20, 22, 24, and 32 inches. All treatments are replicated four times and planted in 100 x 16 ft strips. Xerpha was planted in early September 2010 at both locations.

At Lind, winter wheat grain yields ranged from 29 to 35 bu/acre. There were no significant differences in grain yield, although the 16 and 18 inch spacings, overall, produced more grain than the other spacing treatments (Fig. 1). Grain yields were relatively low because we were unable to apply an air application of fungicide to control stripe rust since the Lind Station contains many wheat breeding nurseries and the breeders do not want fungicide applied to their material.

At Ritzville, winter wheat grain yield ranged from 63 to76 bu/acre (Fig. 1). The 16 and 18 inch spacing treatments produced significantly higher grain yield than the 20, 22, 24, and 32 inch spacing treatments.

Yield component data (data not presented) show that the number of heads per unit area declined with increasing row spacing. Keep in mind that all treatments received the same number of seeds per unit length of row, but not the same number of seeds per acre because the metering flutes on the HZ drill cannot be precisely adjusted. This means that while we planted 50 lbs/acre of seed on the 16-inch row spacing, the planting rate for the 32-inch row spacing treatment was only 25 lbs/acre. We were unable to plant the same number of seeds per acre since the metering flutes of the John Deere HZ drill used in this experiment are not precise enough to calibrate for small planting rate changes. We have addressed this problem by purchasing a special Raven seed metering devise (funded by Ritzville wheat farmer Bill Heinemann) and, beginning in 2012, we will conduct the row spacing experiments with both the same number of seeds per row and the same planting rate (i.e., 50 lbs) per acre in all treatments.

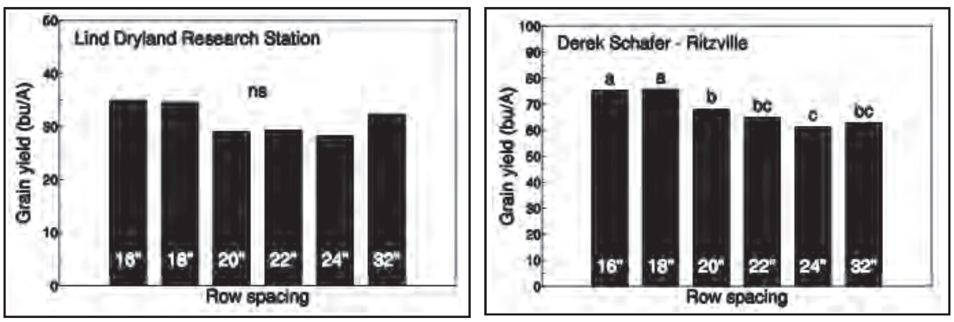

Fig. 1. Winter wheat grain yield at Lind and Ritzville in 2011 as affected by six row spacings. Photo is from harvest of the experiment near Ritzville.

Part 4. Bioenergy Cropping Systems Research

Camelina: Planting Date and Method effects on Stand Establishment and Seed Yield

W.F. Schillinger[1], D.J. Wysocki[2], T.G. Chastain[2], S.O. Guy[1], and R.S. Karow[2]
[1]Dept. of Crop and Soil Sciences, WSU; [2]Dept. of Crop and Soil Science, OSU

There has been keen interest in camelina (*Camelina sativa* L. Crantz) in recent years due to the unique fatty acid composition of the seed oil for human and animal consumption and, more importantly, the value of the seed oil to provide "green energy" to fuel commercial and military aircraft. The objective of our research was to evaluate several planting dates and two planting methods for camelina stand establishment and seed yield. Field experiments were conducted for three years at four distinct rainfed agro-environments in the Pacific Northwest, USA. Average crop-year precipitation at the sites during the three years was: Lind WA, 9.0 inches; Pendleton OR, 16.6 inches; Moscow ID (one year only), 29.9 inches; and Corvallis OR, 39.1 inches. Camelina was planted on an average of five dates at each site (n=55) from early October to mid April at a rate of 5 lbs/acre by either drilling seed at a shallow depth or broadcasting seed on the soil surface. Although camelina has excellent cold hardiness, the best plant stands were achieved with the late-winter and early-spring plantings. Four divergent planting date yield responses across sites were: no yield differences at Lind; increased yield with later planting dates at Pendleton; reduced yield with later plantings at Moscow (one year data) and; a curvilinear response at Corvallis with the lowest yields from plantings in early fall and those after March 1 and highest yields from late-fall and mid-winter plantings (Fig. 1). Both drilling and broadcast were effective for planting camelina with no overall advantage of either method. Seed yields ranged from < 100 lbs/acre during an extreme drought year at Lind to 2600 lbs/acre at Moscow. Averaged across the four Pacific Northwest agro-environments in this study, we recommend: (i) late February-early March as the best overall planting date because of optimum stands and seed yield and having effective control of winter-annual broadleaf weeds with herbicide applied just prior to planting, and (ii) the broadcast method of planting as it generally equaled or slightly exceeded drilling for plant stand establishment and seed yield and can be accomplished more quickly at less expense.

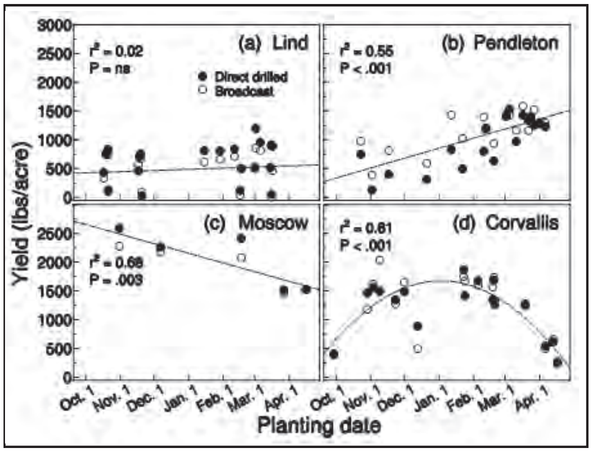

Fig. 1. Effect of planting date and method (direct drilled or broadcast) on camelina seed yield at four locations over three years.

Camelina: Seed Yield Response to Applied Nitrogen and Sulfur

D. J. Wysocki[1], T. G. Chastain[1], W.F. Schillinger[2], S.O. Guy[2], and R.S. Karow[1];
[1]Dept. of Crop and Soil Science, OSU; [2]Dept. of Crop and Soil Sciences, WSU

Camelina has received worldwide attention in recent years as a biofuel crop and as a rotation option for producers of small grain cereals. The objective of our study conducted during the 2008, 2009, and 2010 crop years was to determine camelina seed yield and nitrogen use efficiency (NUE) as affected by six applied nitrogen (N) rates at four sites in the Pacific Northwest. An N + sulfur (S) variable was also included. In 2010, seed oil as affected by applied N and S was also evaluated. The four sites and their average annual crop-year precipitation during the three years were: Lind, WA (9.0 inches); Pendleton, OR (16.6 inches); Moscow/Pullman, ID (27.4 inches); and Corvallis, OR (42.7 inches). The majority of the average annual precipitation at these sites is distributed in the winter and summers are comparatively dry. Camelina responded differently to applied N among sites based upon precipitation and available soil N. Seed yield did not respond to N rate treatments at Lind, presumably due to sufficient soil residual N and limited precipitation. Response of seed yield to applied N was mediated by increased precipitation at Pendleton, Moscow/Pullman, and Corvallis. Maximum seed yield increases attributable to applied N ranged from 19% at Pendleton to 93% at Moscow/Pullman. Based upon the results of this study, camelina seed requires about 5 lbs N per acre per 100 lbs of expected seed yield. Camelina NUE was greatest at Moscow/Pullman although it decreased gradually with increasing applied N rates at all sites. Lind, Pendleton, and Corvallis were the same with a NUE of -0.06 pound of seed for every added pound of N. Nitrogen use efficiency was greatest at Moscow/Pullman and Corvallis, and least at Lind. Camelina did not respond to applied sulfur at any site. Seed oil content was not affected by applied N or S.

Wind Erosion Challenges for Oilseed Cropping Systems

Brenton Sharratt, USDA-ARS, Pullman; and William Schillinger, WSU

The volatility of petroleum reserves, rising price of petroleum products, and climate change has created a worldwide interest in renewable fuels. The United States has set a goal of producing 36 billion gallons of biofuel by 2022 with 21 billion gallons being