ROTATIONAL CROP RESPONSE FOLLOWING APPLICATION OF PYROXSULAM IN WHEAT. Monte R. Weimer, Brett Oemichen, Roger Gast, and Mark Peterson. Dow AgroSciences, Indianapolis, IN.

A key component to exploit the economic and agronomic advantages in diverse cropping systems is having the flexibility to choose and produce a variety of crops at any given time. Chemical weed control is an important component in many cropping systems involving spring and winter wheat. The choice of the rotational crop following wheat may be constrained by the plant back restrictions from the herbicide used for weed control in wheat. Pyroxsulam is a new grass and broadleaf herbicide being developed by Dow AgroSciences for utility in spring and winter wheat. In order to characterize the cropping flexibility after a pyroxsulam application, a series of crop rotation experiments were conducted in the major spring and winter wheat production areas in the United States.

In spring wheat, rotational studies were conducted in North Dakota, Montana, and Idaho. Herbicide injury to oat, sugarbeet, canola, safflower, camelina, soybean, sunflower, barley, lentil, flax, alfalfa, dry bean, field pea, and/or potato was evaluated the season after a pyroxsulam application in spring wheat at 15, 30, and 60 g ha^{-1} (X, 2X and 4X of the anticipated label rate of pyroxsulam in spring wheat). The rotational crop response to pyroxsulam was compared to treatments of flucarbazone (20 and 40 g ha^{-1}) and propoxycarbazone + mesosulfuron (10 + 2.5 and 20 + 5 g ha^{-1}). In winter wheat, rotational studies were conducted in Oklahoma, Kansas, Colorado, Washington, and Idaho. Herbicide injury to field pea, canola, lentil, barley, sugarbeet, potato, chickpea, safflower, soybean, sorghum, sunflower, and/or cotton was evaluated to crops planted the spring following a fall application of pyroxsulam at 18.8, 37.5, and 75 g ha^{-1} (X, 2X, and 4X of the anticipated label rate of pyroxsulam in winter wheat). The winter wheat crop was terminated in the early spring by applying glyphosate to facilitate planting of the spring crops. This procedure simulates a scenario that results in crop failure and the need for emergency re-cropping. Rotational intervals (treatment to rotational crop planting date) of 142 to 176 days were experienced with this procedure. Pyroxsulam treatments were compared to sulfosulfuron (35 and 70 g ha^{-1}), propoxycarbazone (44 and 88 g ha^{-1}), or propoxycarbazone + mesosulfuron (15 + 10 and 30 + 20 g ha^{-1}).

In spring wheat, no visual injury greater than 5% was observed with pyroxsulam treatments (up to 4X rates) on any of the 14 rotational crops the season following application. Visual injury was observed with rates of 20 and 40 g ha^{-1} flucarbazone on oat (5-10% and >10%, respectively), sugarbeet (5-10% both rates), and lentil (>10%, both rates). Visual injury was observed with rates of 10 + 2.5 and 20 + 5 g ha^{-1} propoxycarbazone + mesosulfuron on sugarbeet (5-10% both rates), and lentil (>10%, at high rate). For rotational crops planted after a fall application in winter wheat, pyroxsulam demonstrated the greatest safety as compared to sulfosulfuron, propoxycarbazone, or propoxycarbazone + mesosulfuron. Slight injury (5-15%) from pyroxsulam treatments were observed on sugarbeet, chickpea, and corn at 2 and 4X application rates. No injury was observed on all other rotational crops from the 4X pyroxsulam treatment. At 70 g ha^{-1} sulfosulfuron (2X), which is known to persist in the soil, injury (>15%) was observed on all rotational crops except cotton. Propoxycarbazone applied at 88 g ha^{-1} injured all plant back crops except pea, potato, safflower, and cotton. Propoxycarbazone + mesosulfuron (30 + 20 g ha^{-1}) injured all rotational crops except potato and cotton. These data indicate that pyroxsulam has a good margin of safety, and will be non-injurious to the 19 crops tested even at 2X the proposed use rate the season following application. Additionally, pyroxsulam provides the least potential for injury in an emergency re-cropping situation compared to other products tested. This attribute of rotational crop safety in spring and winter wheat will offer growers greater flexibility in a variety of current and developing cropping systems throughout the U.S. wheat growing regions.

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