monitoring to determine whether cropland soils are achieving carbon sequestration goals. Thoughtful consideration of the environmental and production contexts surrounding Pacific Northwest agriculture, combined with targeted research to identify the most effective carbon sequestration practices, could lead to the development of policies that can realize the real contributions that croplands in the Pacific Northwest can make to climate change mitigation efforts.

For more information, see the full white paper: http://tinyurl.com/y37s62ap.

Part 2. Oilseeds and Other Alternative Crops

Nitrogen Source and Rate to Minimize Damage Caused by Free Ammonia in Canola

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When planning Nitrogen (N) fertilizer application the source of the fertilizer should be considered in order to optimize nutrient availability as well as to avoid damaging seedling root systems. Canola root systems have been shown to be sensitive to urea banded below the seeds. The two primary considerations when choosing a safe source of N fertilizer are the salt toxicity and ammonia/ammonium toxicity. The conversion of ammonium to free ammonia is primarily controlled by the initial pH of the fertilizer reaction. A high pH will lead to more free ammonia than ammonium. Free ammonia has been shown to be extremely toxic to plant cells. Therefore fertilizers with a high pH would be expected to release more free ammonia and consequently have a higher level of toxicity. Urea, Anhydrous Ammonia, and Aqua Ammonia all have pH greater than 8 in solution. Fertilizers with a pH lower than 8 are Ammonium Sulfate, Mono-Ammonium Phosphate, and Di-Ammonium Phosphate. In this study we compared the application of ammonium sulfate (AS) (pH = 5-6, partial salt index = 3.52), urea (pH = 8.5-9.5, partial salt index = 1.61), and urea ammonium nitrate (UAN) (pH = 7, partial salt index = 2.22). In order to establish safe planting guidelines a root assay was conducted in a Palouse Silt Loam soil with N fertilizer sources banded 2″ below the seed row at increasing rates. The gradients of the rates were used to model tap root survival and estimate the LD50s for tap root survival. The LD50 is the rate at which would expect 50% of the tap roots to die. The unconventional unit of mg/cm was used to make the applications and dose response because the actual amount of N which the root is exposed to depends heavily on the row spacing and the application rate (lbs N/A). In Table 1, you can see a conversion between the LD50 (mg/cm) and field rates (lbs N/A) at different row spacings for all three sources. From this table you can see that UAN is a much safer source of N to apply than UAN and that closer row spacing will also decrease the potential for root death.

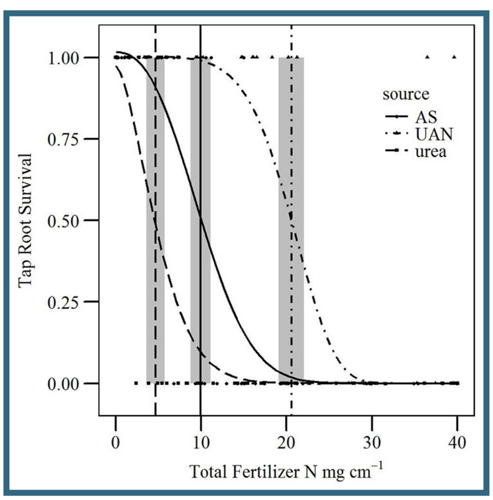

Figure 1. Modeled dose response and estimated LD50s for Ammonium Sulfate (AS), Urea Ammonium Nitrate (UAN), and Urea. LD50s can be converted to lbs N/A for each source by using Table 1.

Take away points: It was determined that canola roots are more sensitive to urea than ammonium sulfate or UAN. This is likely because urea would produce higher levels of free ammonia following dissolution.

Table 1. LD50s of canola tap root survival exposed urea, AS, and UAN

Source	LD50 (mg N/cm)	Row Spacing (in) 6	12	18
		Rate (lbs N/A)		
urea	4.7	27	14	9
AS	9.7	57	28	19
UAN	20.6	120	60	40