LOW INPUT SUSTAINABLE AGRICULTURE (LISA) AND SUGARBEET PRODUCTION IN MINNESOTA AND NORTH DAKOTA

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Many terms with different meanings are used to describe sustainable agriculture, low-input farming, resource efficient farming, organic farming, regenerative farming and alternative agriculture are just some of the titles given to LISA. In many instances, Minnesota and North Dakota sugarbeet producer management systems readily meet the criteria used to describe LISA farming systems. Summaries of grower production practice records and producer survey results indicate the Minnesota-North Dakota sugarbeet industry is a leader in implementing LISA practices.

Minnesota and North Dakota sugarbeet producers have reduced nitrogen fertilizer use by nearly 65 million pounds per year since 1975 while increasing crop sugar content by about 15% and increasing average yields by nearly 25%. Use of soil applied herbicides has been reduced by more than 50% while postemergence herbicide use has more than doubled. However, common recommended use rates of postemergence herbicide have been lowered by 50-75%.

Tillage used to produce sugarbeets in Minnesota and North Dakota has been reduced by 2 to 3 operations per year. This has resulted in fuel, labor and equipment savings and reduced soil loss due to erosion.

Insecticides recommended for sugarbeet root maggot control have been changed to more environmentally safe products. Many of these products are applied by modified in-furrow band application techniques, they are also often applied at reduced application rates. This results in less pesticide introduced into the environment as well as a cost savings to growers.

Cercospora leafspot control programs have been changed to utilize a weather monitoring and disease incidence and severity prediction program. This prediction scheme ensures that fungicides will only be applied when weather and disease severity in fields warrants chemical control measures. This Cercospora leafspot control program has saved Minnesota and North Dakota sugarbeet growers millions of dollars in fungicide costs since 1985. The program nearly

eliminates use of unneeded pesticide and increases environmental safety as well.

Space planting of sugarbeets on nearly two-third's of the acreage has reduced costs for sugarbeet seed by $10-$20/acre. Costs for thinning the sugarbeet crop have also been reduced by about $20/acre.

The sugar cooperatives in Minnesota and North Dakota are also leaders in Integrated Pest Management Programs. They employ about 40 professional agronomists who advise sugarbeet growers on proper use of agricultural chemicals and fertilizers. This service to growers reduces costs and ensures safe, conservative use of pesticides.

A study to evaluate the economic impact of pesticide input level on sugarbeet yield and quality was initiated at Fargo, ND and Crookston, MN in 1990. Labor for weed control without herbicide use was $144/acre at Crookston and $53 per acre at Fargo. Use of appropriate herbicides for weed control reduced labor cost by $108/acre at Crookston and $43/acre at Fargo for herbicide expenses of $50/acre or less. Proper use of herbicides increased gross income by $45/acre compared to use of labor without herbicide.

Use of insecticide for sugarbeet root maggot control increased plant populations by 88% at Crookston, but only 10% at Fargo. Seed treatments had no significant effect on plant population at either location.

Further research will be conducted at Fargo and Crookston in 1991-1993 to evaluate the cost-benefit impact of pesticide use and other low input production strategies on sugarbeet yield, quality and income per acre.