

Why we need a Green House at the Langdon Research Extension Center?

Our farmers grow a wide range of field crops in NE North Dakota. We need science based research data to try to get disease minimizing results out faster before the grower's operation is negatively affected.

The weather in NE North Dakota is congenial for pests high levels of crop disease which cause millions of dollars loss. In the past we lost the Durum Triangle to diseases, field peas are losing acreage to root rots. Now we may lose canola acreage to a new disease called clubroot, identified in NE North Dakota.

Research Projects which can be conducted in Langdon greenhouse, as a pathologist:

1. **Clubroot pathotype determination:** Situation demanded faster results as the disease spreading rapidly in North Dakota where no chemical control for this disease so far, only use of resistant varieties works. Using resistant varieties frequently leads to resistance breakdown due to development of new pathotypes/races (Canadian Research). In order to determine the pathotypes/races of clubroot in ND, it took one year to get ¼ of my sample results, to work on all the samples I was invited to their greenhouse and complete the remaining work. **Note:** The researchers we have been collaborating are from University of Alberta, Edmonton, Canada. Consider the time, money, travel, and the economic importance of crop.
2. **Clubroot germplasm evaluation:** There is an urgent need to screen for clubroot resistance canola lines, as current clubroot resistance is from a single source; it is vulnerable to faster resistance breakdown.
3. **Clubroot soil amendments in greenhouse:** saves time and money, in single year we can research two years' worth of field trials.
4. **Environmental control:** Often, we lose a research trial, as the crop did not get significant disease due to warmer weather; consider the time, money and efforts we lose here. Whereas, in greenhouse under controlled condition we can perform the trial twice in a season with desirable disease.
5. **Blackleg germplasm evaluation:** Every year we test 100's of germplasm to evaluate canola lines for blackleg resistance in field condition, if we have a greenhouse in Langdon, can test up to 1000 lines in one season.
6. **Soybean cyst nematode** prevalence is increasing in ND, just a bioassay in the greenhouse will determine presence or not in the soil of growers field.
7. **Resistance to fungicides:** Repeated use of fungicides on a pathogen leads to resistance, we can determine far ahead by conducting lab and greenhouse studies.
8. **New crop introduction:** Crops in ND without prior data on possible diseases they can be infected, for instance, Faba bean white mold and Chocolate spot (we did the first reports from Langdon by field studies and collaborative studies) and similarly, hemp is infected with quite a few diseases, not able to prove to the scientific and grower

community as the seed cannot be given to other researchers, if we had a greenhouse we could have proved by now.

9. New Disease Identified then what?

Soybean Sudden Death Syndrome in soybeans have been identified by us in Cavalier County, it's a new disease to this area so limited to no management options available to recommend. Resistant varieties are available but none in zero maturity group which is suitable to us. Preliminary research in greenhouse on these lines can help growers in managing this disease without significant losses.

10. Other research projects that can be done at our research center greenhouse: Bioassays of wild oat resistance to various herbicides, flea beetle resistance to insecticides on canola greenhouse studies (one of our colleague stays in Fargo for two weeks to do this trial to perform the trial and then travels once in a week to monitor, hires a student hourly, consider the time, travel, lodging).