

1,4GROUP

Research and Development



Research Facility



- ❖ **Full scale research facility in Meridian, Idaho**
- ❖ **Highly knowledgeable team of personnel with 200+ years of experience**
- ❖ **Potato storage focus**
- ❖ **University collaboration (U of Idaho, Wisconsin, Maine, OSU, Penn State, Canadian & European research institutes)**
- ❖ **Close affiliation with DiChlor Laboratory**
 - Independent, local laboratory**
 - Cost effective**
 - Fast, reliable results**
 - Maintains confidentiality with results**

Unique Research Approach at 1,4GROUP



Chemicals are fogged into containers as done in commercial storages to replicate real world conditions



Research conducted on numerous potato storage chemicals



Naphthalene Family (1,4SIGHT, Amplify)
CIPC (Solid, Emulsified Concentrate)
Essential Oils (20+ screened)
Alcohols
Ketones (Smart Block)
Hydrogen Peroxide

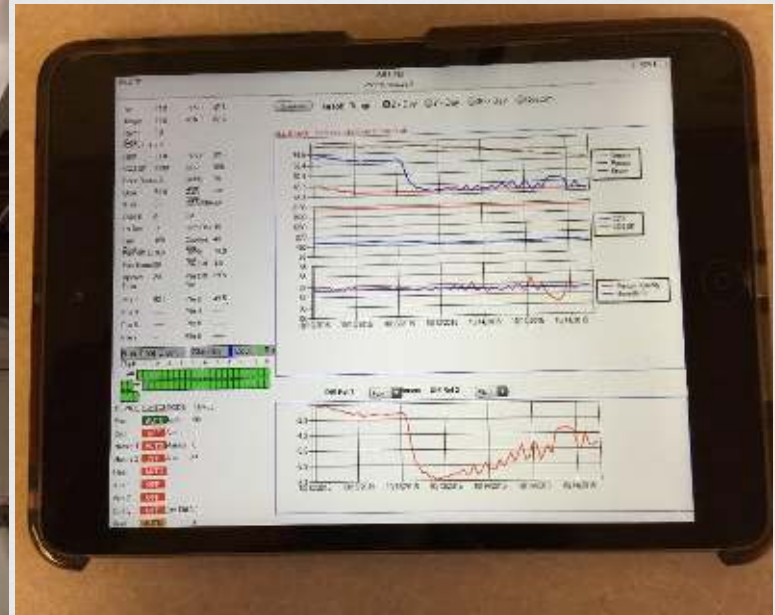
Research Capabilities

Study size options



☞ Independent Bins – 6000#

☞ Computerized monitoring and data capture



Bins are 6 independent rooms, capable of replicated studies

Research Capabilities

Study size options

∞ Barrels 200 pounds



∞ Ammo Cans 35 pounds



Research Capabilities

Study size options

∞ Jars – 4 pounds



∞ Jars – 0.5 pound



Research Capabilities Environmental Manipulation



5 Storage Facilities to Manipulate:

**Temperature
Oxygen
Carbon Dioxide
Humidity
Ventilation**

Field Experience



**Research conducted on
Impact of field conditions
on seed and storage**

Sprout Index



**Industry standard equation
to evaluate level of peeping & sprouting in potatoes**

$$[(\%N \times 0.0) + (\%A \times 2) + (\%B \times 6) + (\%C \times 15) + (\%D \times 40)]/100$$

N – Not Sprouted

A – 2mm

B – 2.1 to 10mm

C – 10.1 to 20mm

D - >20.1mm

Scale of 0 to 40

0 to 10 acceptable for processing

0 to 5 acceptable for fresh pack

Research Objectives



- **Compare alternative sprout control programs for early sprouting varieties.**
- **Develop methods with best sprout control at reasonable cost.**
 - **Conduct an analysis of mold development.**
 - **Conduct pressure flattening, pressure bruise, and internal sprouting studies.**
 - **Research Rhizoctonia development on seed.**
 - **Cater to our customer's needs for research.**

Research Data Collection



- ❖ **Field conditions, climatic patterns & harvest data collection**
- ❖ **Shrink – initial and final weight of each unit**
- ❖ **Sprout index at mid and end of season.**
- ❖ **CIPC and DMN residues immediately after each treatment and at the end of the study.**
- ❖ **Mold evaluation**
- ❖ **Sugar analysis**
- ❖ **Percent Rot – Decay Analysis**

Research Results



- ❖ **Confidentiality is maintained with all studies.**
- ❖ **Only contracted client will have access to all data points**
- ❖ **Interim reports to be generated and presented**
- ❖ **Visits encouraged, especially during testing phases**
- ❖ **Final information compiled into written report & PowerPoint**
- ❖ **Presentation of completed project**
- ❖ **Continued customer service following completion of project**

Thank you!

Questions?