



System Profile: Dale Gies

Dale Gies farms about 8 miles south of Moses Lake, Washington. For six years he has been using a two-year rotation of wheat and potatoes with good results. He attributes much of his success to the use of a white mustard green manure crop between the wheat and potatoes. He believes that the mustard makes this short rotation possible. Recently, WSU Cooperative Extension has been working with Gies to document the benefits of the mustard and to investigate the possibility of eliminating fumigant treatments on his best fields.

Crops: Dark Northern spring wheat, Russet Norkotah potatoes

Cover crop: White mustard (*Sinapis alba*) or Oriental Mustard (*Brassica juncea*)

Location: Grant County, near Moses Lake

Soil: Timmerman sandy loams and loamy sands. pH: 6.4-6.6

Overview

Rotation

Year	Crop	Planting Date	Harvest Date
1	Wheat	Early to mid-March	Early August
1	Mustard	Early-mid August	Late Oct.-early Nov. as green manure
2	Potato	Early-mid April	Mid Sept-early October

System details

Dark Northern Spring Wheat (for seed)

Tillage: No tillage occurs between potato harvest and spring. Gies believes that this provides good control of potato volunteers and better erosion control than does fall tillage.

- Before planting, an offset disk is used to level rows and cut residue. Then Gies chisel plows and plants in one pass. A dammer-diker is later used.

Soil Fertility management

- Nitrogen: 30-40 lb per acre left after potatoes, applies N and S through pivot in 6:1 ratio
- Phosphorus: from previous year
- Potassium: from previous year

Weed control: Uses SUs and phenoxy's that will not affect following mustard

Insect control: Usually none needed.

Disease control: Few problems.

Irrigation: Soil moisture is kept in same range as potatoes. Water is cut back as plant use decreases.

Yield: 140-150 bu/ac. at 13.8-14.5% protein

White Mustard Green Manure

Varieties: White mustard 'Martigena', also uses an Oriental mustard variety.

Planting: Has recently started using a Great Plains grain drill to plant the mustard into undisturbed

wheat straw. Is now experimenting with seeding rates higher than 10 lbs. per acre.
Incorporation: Mowed with a high speed flail chopper and then quickly disked twice.

Soil Fertility management

- Nitrogen: applied through pivot after volunteer wheat is killed (see Weed Control below), need 120 lb. per acre (100-150 range) available over season, with S at 6:1 N:S.
- No additional Phosphorus or Potassium is usually needed.

Weed control

- Volunteer wheat is controlled using Fusillade, Assure II, Poast, or Select.
- Problem weeds: has flown on Roundup before the mustard emerges to kill larger weeds, especially lambsquarters, that were growing in the wheat.

Russet Norkotah Potato

Tillage

- Preplant: In mid-March, metam-sodium is shanked in with a Noble plow. Just before planting the fertilizer is spread (P, K for two years, 1/3 N, and 1/3 S) and incorporated with a Lilliston tillager.
- No post harvest tillage

Soil Fertility management

- Nitrogen: applies an average of 100 lb. nitrogen per acre at planting, and as needed during the 8-week growing period. Nitrogen is applied through the pivot, always with S in 6:1 ratio N:S.
- Phosphorus and Potassium: The soil is sampled for P, K, and nematodes in the fall. P and K applied preplant according to soil test results.
- Testing
 - Plant: petiole samples are taken weekly from mid-June to Aug. 1st, and used to look for trends. Management not based on individual petiole sample results because they vary too much from sample-to-sample and year-to-year.
 - Soil: Geis sees a spike of N in mid-June and thinks it is from cover crop breakdown.
- Other Soil Amendments: Zinc, boron, nitrogen and sulfur banded at planting (6:1 N:S ratio), at 1" above and 2" to side of seed piece

Weed control

- Cultivation: Geis uses a spring-tine harrow about two weeks after planting, at white shoot stage for weeds, and follows with a dammer-diker as plants are emerging in mid-May.
- Herbicides: varies from year to year.

Insect control

- Scouting (IPM): Has worked well for Norkotahs
- Insecticides: Tries to use effective products that are least damaging to beneficial insects.

Disease control

- Gies has seen a decrease in the incidence of white mold, *Sclerotinia sclerotiorum*, in his potatoes.
- Geis does not have Columbia root-knot (*M. chitwoodi*) nematodes.

Irrigation

- Geis uses the high-speed option on all pivots.
- Applies 0.5-0.75" per pass
- Uses a combination of ET data and soil probe results to maintain at 70-95% of field capacity. When it is hot, he stays at 80% of field capacity or above. Because of his good infiltration rates he can slow pivot down and gets less disease.
- Rooting Depth: 20" during hot, late season periods

Harvest

- Yields: 32-37 tons per acre for last 5-6 years

Gies' Edge:

- Farms only land he owns, allowing him to develop a unique rotation and reap the long-term soil quality benefits of his cover crops and reduced tillage.
- Use of the white mustard cover crop allows him to successfully grow Norkotah potatoes every other year. These are short season potatoes for the fresh market and so he does not have to worry as much about diseases and specific gravity as growers of processing potatoes.

Advantages Gies sees:

- Increased infiltration
- Better soil tilth
- Easier to dig potatoes at harvest
- Less disease problems
- Less wind erosion

What Geis says...

"Tying the whole system together makes it work economically, and it improves the soil"

"Better soil is money in the bank"

"Everybody thinks you're lying when you tell them the results"

"The mustard increases the weed pressure for a few years, it stimulates weed seed, but in the long run you should have less problems"

"In minimum till system winter annuals can be more of a problem"

This publication and other cover crop information is available online at <http://grant-adams.wsu.edu>

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