

Triple-Cropping Dairy Forage Production Systems through Conservation Tillage in California's San Joaquin Valley

Jeff Mitchell (Research & Education Grant Program)

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Title: Triple-Cropping Dairy Forage Production Systems through Conservation Tillage in California's San Joaquin Valley

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No-till established sudangrass triple-crop emerges in corn residue at Gwerder Dairy.
– Photos by Jeff Mitchell



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Situation:

Excess nitrate in groundwater under California dairies is common, and recent regulations prohibit applications that exceed 140% of crop removal. This standard could force many dairies out of business, especially small ones, if they cannot acquire additional land.

Triple-cropping – growing three forage crops a year – utilizes more manure nutrients on the same ground and provides more feed. But it depends on timely harvests of winter small grain forages and summer corn silage.

Conservation tillage practices, used in other parts of the United States but essentially new in California, eliminate intercrop tillage operations, shorten the cropping interval, and allow for faster planting and harvest. This could make triple-cropping a potentially reliable component of sustainable nutrient management plans.

Objectives:

1. Increase the reliability of triple-cropping dairy forage production with the use of conservation tillage practices as a means of increasing forage biomass and nutrient uptake by determining production rates and N removal in triple-cropped forage fields compared with standard double-cropped fields
2. Evaluate triple-cropping compared with standard double-cropping forage production in terms of whole dairy nitrogen budgets and profitability
3. Extend widely information developed by the project to dairy farmers, consultants, and industry groups via a variety of extension education means
4. Track changes in the adoption of conservation tillage forage production practices in the San Joaquin Valley as evidenced by conservation tillage acreage surveys conducted by California's Conservation Tillage Workgroup and conservation tillage equipment sales records



In the foreground is recently harvested strip-till planted silage corn. This shows the potential for planting early silage corn for chopping.



Dairy farmer and project partner Frank Gwerder operates the tractor pulling the no-till drill planting triple-crop sudangrass following strip-till silage corn at Gwerder Dairy in Modesto.

Actions:

Field evaluations of triple cropping (the production of three forage crops in a give year versus standard double-cropping practices) have been established at the San Joaquin Valley dairies of Frank Gwerder in Modesto and Danny Peterson in Turlock.

In the first year of the project, these activities have been conducted:

- Biomass production and tissue nitrogen content for each of the crops in these dairy silage fields have been sampled and determined at approximately weekly intervals
- Soil nitrogen has been monitored at key times during each crop cycle
- Air temperature information has been collected
- Large-scale field yield determinations have been made in conjunction with each partner farmer
- Data from the monitoring activities are being compiled and summarized

An adjunct evaluation of twin-row strip-tilled corn vs. single-row strip-tilled corn was initiated at the dairy of Dino Giacomazzi in Hanford.

The project team also hosted public seminars featuring John Landers, a noted no-till expert in Brazil, at the dairy farms of Frank Gwerder in Modesto and Tom Barcellos in Tipton.

Information related to the goals of the SARE project and initial experiences were presented in February 2009 at the Conservation Tillage Workgroup's display during the 2009 World Ag Expo at Tulare.

Results:

During the study's first year, the project team noted two potentially significant constraints of conservation tillage practices used to facilitate triple-cropping at the dairies:

1. At the Petersen dairy, manganese deficiency occurred in the strip-till triple-cropped corn crop and reduced silage yield. It was hypothesized that this resulted from nutrient stratification in the soil of the conservation tillage system. To address the situation, a shallow disking was done before corn planting in 2009.
2. At the Gwerder dairy, problems aligning the corn planter following strip-tilling were observed, resulting in reduced forage production in the conservation tillage system. The situation has been discussed with Frank Gwerder, and plans were made to remedy the problem in the next corn planting.



Recently seeded triple-crop at Petersen Dairy in Turlock

Work Remaining

In the coming cycle, the project team will continue field monitoring and consolidating the data and applying it to the APTRAC Manure N Management Model.

The project team will also target more extension education events for San Joaquin Valley dairy producers.



Maturing no-till planted sudangrass triple-crop at Gwerder Dairy.



At right, strip-till planted silage corn compares with conventionally planted silage corn using full intercrop tillage at left.