

Results

Soil N and P were extremely variable. In some cases soil N and P were higher in all plots after cover crop planting. This was probably because the plots were too small to effectively assess the removal of N and P from the soil. However, tissue analysis revealed that very large amounts of N and P were accumulating in the grass cover crops. The range of N accumulation (and removal from the soil) was 155 lb./A to 532 lb./A for barley and 163 to 546 lb./A for oats. P accumulation was much lower ranging from 11 lb./A to 29 lb./A for barley and 10 lb./A to 61 lb./A for oats. Because of the removal of large amounts of N from the soil by these cover crops this approach to reducing non-point source pollution by grass cover cropping has potential as a Best Management Practice (BMP) for growers utilizing bare ground fallow systems.

Weed suppression in the test plots was excellent if the seeding was uniformly distributed (Fig. 2). In most cases the grass covered 90 – 100% of each plot and “out competed” the major weed pests in these fields: spiny amaranth (*Amaranthus spinosus*), Aiea morning glory (*Ipomoea triloba*), purple nutsedge (*Cyperus rotundus*), and guinea grass (*Panicum maximum*). Each of these weed species were major weed problems in sugarcane production. Because of the aggressiveness of these weeds bare ground fallow is maintained by seed producers to minimize their proliferation. The bare ground fallow approach normally includes a plowdown of crop residue followed by 1 or 2 additional plow downs of sprouting weeds. The bare ground fallow approach also utilizes an herbicide spray if additional weed control during the fallow period is required.

Figure 2. Oats cover crop (l) vs. weedy check (r).



Field Day and Grower Training

A field day was conducted on April 25, 2003, to demonstrate the use of the grass cover crops for weed suppression. Additionally, a Grower Training session was



conducted at Pioneer Hi-Bred International, Inc.’s facility in Waialua on May 21, 2003. The purpose of the training session was to detail how to use cover crops as an alternative to bare ground fallow for managing weeds between cash crops. Cost comparisons between the bare ground fallow practice and cover cropping were presented:

OPERATION	BARE GROUND \$/acre	COVER CROPPING \$/acre
Corn Plow Down	25	25
Seed Cost	-	44
Seed Incorporation	-	25
Second Plowing Round	25	-
Third Plowing Round	25	-
Herbicide Application	40	-
TOTAL	115	94

If a third plowing round and herbicide application are used to maintain a bare ground fallow then the cost for cover cropping is reduced for the grower. Costs for bare ground fallow practices (plowing and herbicide application) were obtained from Pioneer Hi-Bred International, Inc. Seed cost was the highest single component of both practices and could be reduced more if large volumes of seed are purchased (1,000 pounds of seed were secured for the project).

Additional benefits of cover cropping were also discussed with the growers: minimizing loss of valuable top soil, increased soil organic matter, reduced pesticide applications, and *refugia* for natural enemies (Fig. 3). Barley and oats seed were distributed to growers to trial on their own farms. As diversified agriculture increases in Hawaii the use of cover crops for maintaining soil and general environmental health will be an important management tool.



Figure 3. Ladybird beetles were abundant in grass cover crop plots.

Participants and Cooperators

This project was designed and conducted as a cooperative community and industry endeavor. The lead organization was the Hawaii Farm Bureau Federation (HFBF). Businesses and organizations involved in the execution of all project tasks were:

Project Manager: Dr. John McHugh, Hawaii Farm Bureau Federation

Grower Logistics: Dr. Mike Austin, Pioneer Hi-Bred International, Inc.

Student Coordinator: Jenny Falcon, Pioneer Hi-Bred International, Inc.

Student Participants: Asa Chun, Cora Dacuycuy, Kim Delong, Desiree Garcia, James Kumura, Lawrence Sumaoang, Waialua High School

Community Logistics: Lynne Constantinides, Crop Care Hawaii, LLC

Land Preparation: Milton Agader, Al Medrano (land preparation, seeding, and plot maintenance), Twin Bridge Farms, Inc.

Technical Advisor: Dr. Carl Evensen, University of Hawaii at Manoa

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Student participants (l-r: L. Sumaoang, J. Kumura, D. Garcia, K. Delong, A. Chun) and project manager (J. McHugh - far right).

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