D'ARRIGO BROS. CO., OF CALIFORNIA

FARM WATER CONSERVATION & PROTECTION

CASE STUDY

EXECUTIVE SUMMARY

At D'Arrigo Bros. Co., of California, we make it a point to conserve water and protect our natural water resources. We also implement practices to maintain healthy soil and keep it where it belongs by eliminating tail water run-off. Our efforts to pioneer efficiencies and consistently evaluate and refine our farming methods have resulted in:

- 15% reduction in irrigation water use
- Elimination of tail water run-off at ¾ of our farms
- Soil organic matter protection practices throughout all of our operations
- Field research, trials and evaluations to help us improve practices and processes

When asked why we do all of this, our response is simple: to ensure the highest quality food crops, effective use of all farming inputs, and to support healthy communities.

With productive soils and committed employees as our solid foundation, the resilience of D'Arrigo Brothers is proven in our ability to bring you a wide array of products year after year.

INTRODUCTION

From our company's inception in 1927, D'Arrigo Bros. Co., of California has approached business and stewardship decisions with a current day business sensibility while also looking ahead at the long-term impact of those decisions. We recognize that today's decisions affect generations to come.

Conserving and protecting our water and soil resources is a cornerstone of D'Arrigo Brothers sustainability efforts. Efficient use of irrigation water is crucial to conserving our natural surface and groundwater supply.

We also recognize that maintaining healthy soil and good management of soil nutrients leads to efficient use of water and added fertilizers.

If not tightly controlled, excess irrigation can move water and soil across the land (tail water run-off), carrying sediment and farm inputs such as fertilizers and crop protectants into our rivers, creeks and streams. In addition, too much irrigation water at the wrong time can move fertilizers deep into the soil where plants cannot use it - potentially entering our groundwater. We recognize that groundwater is a resource we share with others and want to do our part to protect this vital, natural resource.

D'Arrigo Brothers concentrates efforts on eliminating tail-water runoff to keep water and soil where they belong. Being efficient with our water use now helps us to conserve as much water as possible for the future. To do this, we use no more water, fertilizer, or crop protectants than it takes to grow our crops – resource efficiency, it turns out, is good for everyone.

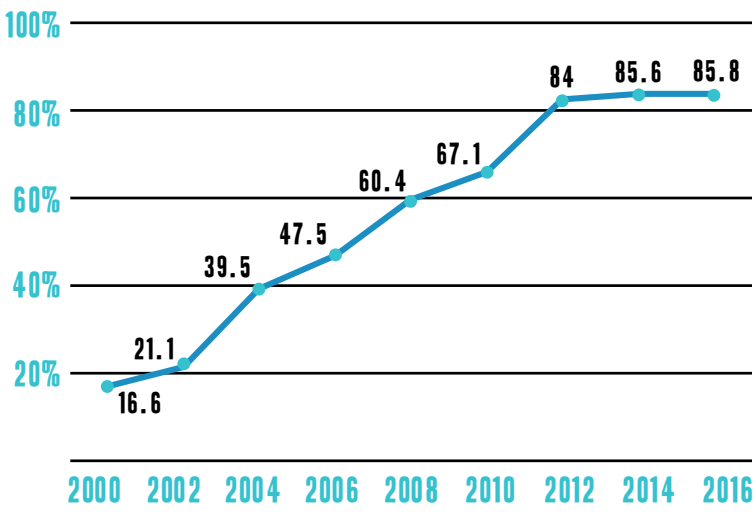
OUR FARMING VALUES:

WATER CONSERVATION

Beginning in 2000, D'Arrigo Brothers was among the first growers in the Salinas Valley to begin irrigating crops with drip tape to deliver precise amounts of water and fertilizer directly to the roots of the plant. We ambitiously set a goal of irrigating 50% of our crops with drip irrigation by 2012 and during that time frame, we gradually evolved our operations from 100% sprinkler irrigation to now using drip irrigation at every ranch for nearly every crop grown - far exceeding our goal!

As pioneers in drip irrigation, our efforts have helped us use 15% less water than before drip became our primary method, benefiting everyone within the groundwater basins where we farm. This transition has also helped us eliminate tail water-run off on most of our ranches - a top priority for D'Arrigo management. In addition, maintaining healthy soils through the time tested soil building methods of composting, cover cropping and incorporating crop residue, has enabled us to produce high quality crops using less water and fertilizer.

% OF DRIP ADOPTION



WATER RESOURCE PROTECTION

SURFACE WATER: CREEKS, RIVERS & STREAMS

To protect our surface water, D'Arrigo Brothers made the elimination of tail water run-off a top priority for management at all of our farms. By 2010, we achieved 100% reduction of run-off at 72% of the farms where it was occurring. At the remaining farms, we have reduced run-off by 50% and are actively working toward zero run-off by increasing irrigation efficiency and developing tail water retention.

Our efforts to protect our creeks, streams, and rivers include:

- **Soil erosion control and prevention** through ground leveling, sloping farm roads toward farm fields; vegetation, and maintaining good soil structure
- **Utilization of drip irrigation systems** which allows for the precision placement and amount of water and fertilizer application
- **Testing the uniformity of water delivery** through irrigation efficiency evaluations
- **Controlling irrigation tail water** by cutting "tail ditches" or diverting water into vegetation and retention areas
- **Control and prevention of trash or debris from entering water**
- **Conducting regular evaluations** to prioritize problems and develop a plan of action

GROUNDWATER: WATER FOUND BENEATH THE EARTH'S SURFACE

D'Arrigo Brothers knows how important it is to protect groundwater for future generations of farmers and communities. If the nitrogen fertilizer that we need to grow healthy crops enters local drinking water supplies as nitrate, community health can be affected - especially infants, nursing mothers, and the elderly.

We take seriously the need to protect drinking water for all of the communities we are a part of through careful and efficient use of fertilizers and other management practices. D'Arrigo Brothers will always ensure a safe, clean, consistent drinking water supply to every person living or working on D'Arrigo farms.

In addition to only using the necessary amount of water, fertilizer and crop inputs for crop growth, we also protect groundwater through:

- **Well head protection devices** that prevent the possibility of farming materials back-flowing into groundwater
- **Safe storage of fuel, fertilizers, and chemicals**

SOIL HEALTH & FERTILITY

Soil organic matter is the foundation for a plant's natural defenses against pests and disease, as well as its ability to efficiently use water and fertilizers. Soil organic matter also increases soil's ability to retain water and nutrients that are needed for a plant's growth. Healthy soil and good management of soil nutrients lead to the efficient use of added nitrogen fertilizers.

Here are three ways D'Arrigo works to maintain soil organic matter.

INCORPORATION OF CROP RESIDUE - RECYCLING A PORTION OF EVERY CROP WE GROW

Crop residue is the un-harvested portion of a plant - such as the roots and outer wrapper leaves on a head of lettuce. This residue gets plowed into the soil and is a critically important source of organic matter for the next crop in rotation.

COVER CROPS - SOIL BUILDING, SOIL PROTECTING

Cover Crops have so many benefits that D'Arrigo rotates hundreds of acres into our regular cropping schedule every year. The cover crop varieties we've used not only build soil organic matter, but they also help prevent plant diseases, prevent loss of valuable top soil from erosion during storms, provide a rotation that breaks pest and disease cycles, and keep fertilizers, water and crop protectants in the field where they are needed. We love cover crops!

COMPOSTING - MORE SUPPORT FOR OUR SOIL RESOURCE

Composting is an age-old grower method for delivering organic matter and nutrients to soil. These days, only certified safe compost is applied in a rotation of our ranches each year.

EVALUATION & FIELD RESEARCH

Measuring changes to improve practices and processes is the foundation of D'Arrigo's sustainability program. The ongoing evaluation of our farming methods means we develop baselines from which to measure improvements over time. This involves recording and managing large amounts of farming data for analysis.

Our company has a long tradition of supporting field research as well as conducting our own trials and evaluations. We have regularly partnered with the University of California Cooperative Extension (UCCE), the CA Lettuce Research Board, the Monterey Bay National Marine Sanctuary, NASA-AMES, Crop Production Services and others to explore new methods for optimizing the way crops are grown.

Here are some examples (past and present):

- **Evaluating water and nutrient use efficiency -** Comparing the water and nitrogen needs of various crops at different growth stages to the amounts and timing of nitrogen available from irrigation water
- **Testing cover crop varieties and their benefits -** UCCE field trial to assess various types of cover crops for their ability to take up and store residual nutrients in the field
- **Preventing soil and nutrient loss from the field -** UCCE research trial of Poly-acrylamide, or "PAM". PAM is a long-chain organic polymer used to aid in settling out sediment at the field-level, rather than losing valuable soil and nutrients as water leaves the field.

Pictured is the computer connected to the soil sensors to collect and store moisture readings directly from the field. The information will be used to make an informed irrigation decision.

GENERATIONS OF UNPARALLELED QUALITY

It is hard to imagine that when Andrea and Stefano D'Arrigo's father shipped their broccoli seeds to San Jose, California from Italy in the 1920's, this delicious and nutritious mainstay was virtually unknown in America. Along with Broccoli, the D'Arrigo family brought passion for growing fresh fruit and vegetables that has continued through today. D'Arrigo Bros. Co., of California (Andy Boy Label) is a family-owned company specializing in Artichokes, Broccoli, Broccoli Rabe (iceless and iced), Butter Lettuce, Cactus Pears, Cauliflower, Fennel, Green Leaf, Iceberg Lettuce, Nopalitos, Organic Romaine Hearts, Organic Nopalitos, Red Leaf, Romaine, Romaine Hearts and Shrink Wrap Broccoli. Andy Boy is in the business of bringing healthy products to families here at home and around the world. We take great pride in the perfection of nature's greatest bounty.

WWW.ANDYBOY.COM

D'ARRIGO
BROS OF CALIFORNIA