# Stand Establishment Operating Costs (Tables 1-3)

Tables 1 through 3 show the costs associated with ground preparation, planting and establishing an alfalfa stand. Land preparation and planting are done in the fall.

The establishment year ends after the herbicide application in December.

## Land Preparation.

* 1. Stand establishment begins by discing down (stubble disc) the residue from the previous crop,
  2. followed by a pass with a rice roller.
  3. Next, the ground is chiseled to a depth of 18 to 24 inches to fracture the soil, which improves root penetration and water infiltration.
  4. Afterward, the field is rolled again with the rice roller.
  5. The fields are then laser leveled by a custom operator at a cost of $175/acre.
  6. Borders (levees) for irrigation checks are made at periodic intervals (60 feet in this study) through the field.
  7. Lastly, the fields are then disced
  8. and harrowed with a ring roller to prepare the seedbed.

## Fertilization.

* 1. Pre-plant soil testing for phosphorous (P) and potassium (K) is recommended. In this study, the PCA collects one soil sample per 20 acres at a cost of $10.60 for each test.
  2. Nitrogen (N) and phosphorus (P) as 11-52-0 at 200 pounds per acre of material
  3. are applied in September prior to the final discing applied using a tractor-pulled fertilizer spreader (other options? Fertigation? Is it only applied at planting?)

## Planting.

* 1. A custom operator plants Roundup Ready alfalfa seed with a Brillion seeder 1/4 inch to 1/2 inch deep
  2. At 25 pounds of seed per acre. The seed is planted in September or October and the stand life is expected to be three years. Cost of seed varies, Roundup Ready seed is used in this study at a cost of $5.84 per pound with an additional $3.00 per pound tech fee.

## Irrigation.

* 1. In this study, the irrigation method is sprinkler irrigation during establishment, (followed by border flood irrigation during production). Water for seed germination is applied using a sprinkler irrigation system in early fall immediately after planting (8 acre-inches). If winter rains do not occur, a second irrigation may be necessary. Water is supplied by the irrigation district and is supplemented by well water. Prices for water vary considerably among irrigation districts and pumping costs vary due to well depth, pumping level and type of irrigation system. This study applies a charge of $130 per acre-foot, ($10.83 per acre inch). Irrigation labor is provided as a separate line item and includes the cost of setting up and taking down the sprinkler irrigation system.

## Pest Management.

The pesticides and rates mentioned in this cost study are listed in Integrated Pest Management for Alfalfa and UC Pest Management Guidelines, Alfalfa. Pesticides mentioned in this study 2016 Alfalfa Costs and Returns Study (300 Acres) San Joaquin Valley South UC Cooperative Extension – Ag Issues Center 3 are not recommendations, but those commonly used in the region. For information and pesticide use permits, contact the local county Agricultural Commissioner’s office. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at www.ipm.ucdavis.edu. Pest control costs can vary considerably each year depending upon local conditions and pest populations in any given year. Adjuvants are recommended for many pesticides for effective control and are an added cost. Adjuvants are not included as a cost in this study. Pest Control Adviser (PCA). Written recommendations are required for many pesticides and are available from licensed pest control or certified crop advisers. In addition, the PCA or an independent consultant will monitor the field for agronomic problems including irrigation and nutrition. Growers may hire a private PCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. In this study, the PCA services are provided by the fertilizer company free of charge.

### Application Methods.

After planting, treatment of alfalfa with pesticides are made by either chemigation (pesticides and/or fertilizers applied through the irrigation water), by tractor or ATV mounted ground/boom sprayer, or foliar-broadcast by airplane. Some pesticides and fertilizers are mixed and applied together during the same irrigation. Some pesticides are applied to a portion of the alfalfa acreage. Pesticides with different modes of action and different active ingredients should be rotated to avoid resistance development by the targeted pests. Fertilizer is applied using a tractor pulled fertilizer spreader and pesticides are applied via an ATV sprayer system with a 30’ boom.

#### Weeds.

Broad-spectrum post-emergent herbicides, such as Roundup PowerMax, are applied depending on environmental conditions.

1. A pre-emergence herbicide such as Treflan TR or Prowl H20 could be applied for grass control, but is not included in this study during the establishment year. How much?
2. A pre-emergence herbicide (such as Treflan TR or Prowl H20) could be applied for grass control, but is not included in this study during the establishment year. pesticides are applied either by chemigation, by tractor, ATV, or airplane
3. In this study, Roundup PowerMax
4. is applied to the field at a rate of 2 pints per acre in December of the establishment year. pesticides are applied either by chemigation, by tractor, ATV, or airplane
5. Contact herbicides, such as Gramoxone, or Select Max, how much?
6. could also be applied for selective weed control and to combat species shift & resistance. pesticides are applied either by chemigation, by tractor, ATV, or airplane
7. In some areas of the San Joaquin Valley, sheep are introduced and allowed to graze the alfalfa fields in January as a weed, Sclerotinia Stem, and Crown Rot control measure. This operation and associated costs are not included in this study.

# Production Operating Costs (Tables 4-11)

## Irrigation.

During the production years, this study uses border flood irrigation. The water is pumped through alfalfa valves at the head of the field and flows down the alfalfa check between the borders.

* 1. A semi-permanent drain ditch is dug at the edge of the field using a V-Ditcher pulled by a tractor. All field operations turn inside the field and do not cross the drain.
  2. From April to October, ten irrigations totaling 64 acre inches (5.3 acrefeet) of water are applied by flooding the checks based on evapotranspiration (ET) requirements.

Applied water values are greater than the actual water requirement due to an estimated application efficiency of 75 percent. The actual water requirement will vary each year based on soil, climatic, and plant physiological factors. Irrigation includes the water and pumping costs, with irrigation labor provided as a separate line item. Water costs will vary considerably depending upon the irrigation district and, when pumped, upon the due to well depth, pumping level and type of irrigation system. A cost of $10.83 per acre inch ($130 per acre foot) is used in this study. Due to the high cost and/or unavailability of water in recent years, some growers have reduced water usage or summer fallowed the fields at a cost of lower yields.

## Fertilization.

After establishment, plant tissue tests should be taken each year to determine nutrient requirements. Tissue samples should be scheduled once during the growing season and your Ag consultant 2016 Alfalfa Costs and Returns Study (300 Acres) San Joaquin Valley South UC Cooperative Extension – Ag Issues Center 4 (PCA) may recommend this be done in either the spring or fall.

* 1. Tissue testing in this study is done each year in August to determine the levels of P and K. Costs shown are for the analysis based on one sample per 20 acres collected by the PCA at a cost of $25.90 per sample.
  2. In this study, an allocation of phosphorous as 11- 52-0, at 200 pounds per acre
  3. is charged to the field each year in the fall. Subsequent micro-nutrient fertilizers are applied as needed based on the tissue analysis and PCA recommendations.

## Pest Management.

The pesticides and rates mentioned in this cost study are listed in Integrated Pest Management for Alfalfa and UC Pest Management Guidelines, Alfalfa. Pesticides mentioned in this study are not recommendations, but those commonly used in the region. For information and pesticide use permits, contact the local county Agricultural Commissioner’s office. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at www.ipm.ucdavis.edu. Pest control costs can vary considerably each year depending upon local conditions and pest populations in any given year. Pesticides with different modes of action and sites of action, and different active ingredients should be rotated to avoid resistance development by the targeted pests. Adjuvants are recommended for many pesticides for effective control and are an added cost. Adjuvants are not included as a cost in this study.

### Weeds.

* 1. Prior to the first cutting, a post- emergence herbicide can be applied
  2. to control broadleaf and other grasses, such as 2,4-D (Butyrac 200), Buctril, Raptor, or Pursuit, or a combination thereof.
  3. Roundup PowerMax is applied at a rate of 2 pints per acre
  4. Roundup is applied in February of the production year.
  5. During the second year, a pre-emergence herbicide (Treflan TR-10 or Prowl H2O)
  6. may be applied in January for grass control with a second application in April if dodder is expected (the study does not include this application).
  7. Residual herbicides for control of winter weeds could be applied starting at the end of the first year, such as Karmex DF, Velpar L, Chateau or Prowl H2O.
  8. This application is included in this study at a rate of 4 oz/acre of Chateau and 1 gallon/acre of Prowl H2O in December of the production year.
  9. A contact herbicide (Gramoxone)
  10. may be applied at the end of the second year, and is included at a rate of 1.5 pints per acre in this study.
  11. In May of the third year, a post emergence herbicide (SelectMax or Roundup)
  12. is applied to control summer grasses. This application is included in this study at a rate of 2 pints per acre of Roundup PowerMax during May of the production year.

The herbicide costs will vary slightly during the production years due to the difference in weed control each year. For additional information regarding weed management, refer to the “Herbicide Treatment Table for Seedling Alfalfa” available on the UC Davis IPM website (http://www.ipm.ucdavis.edu). The table provides a listing of available herbicides and their application rates and times.

Insects.

Several insect species attack alfalfa, but alfalfa weevil, aphids, alfalfa caterpillar, and armyworms are the pests that cause the most economic damage.

* 1. Weevils and aphids are assumed to reach population levels requiring a single treatment for control for which the insecticide Warrior II (lambda-cyhalothrin, a synthetic pyrethroid)
  2. is applied at a rate of 1.5 fl oz per acre in March of the production year.
  3. Aphids can also be controlled with an application
  4. of Sivanto (flupyradifurone).
  5. Worms, alfalfa caterpillar and armyworms are controlled in July with the insecticide Coragen (chlorantraniliprole)
  6. application of 3.5 fl. oz. per acre during July of the production year.

## Harvest.

* 1. In this study, the alfalfa is harvested for hay seven times: April, May, June, July, August, September, and October. Alfalfa for hay is cut with a selfpropelled swather and left to dry for several days before
  2. it is turned and windrowed using a rake.
  3. Once the hay has dried to the correct moisture content, it is baled into 1,300-pound square bales.
  4. The bales are picked up with a bale wagon that moves them from the field and roadsides them in a stack. A conversion kit is attached to the standard bale wagon to handle 1,300 pound square bales.
  5. Haylage harvest two times, March and November. For haylage, the alfalfa is cut and wilted in the field,
  6. then chopped into a truck or trailer
  7. taken to the dairy where it is placed in a bag, pile, or bunker for ensiling. Haylage is typically produced for a dairy enterprise and is harvested by the buyer.

Custom Harvest versus Grower Harvest. This study uses a custom harvesting company to swath, rake, bale, and roadside (pickup bales and stack) the harvested alfalfa. In this study, the custom harvester charges are: swathing/raking at $22.50 per acre, baling at $12.00 per bale, with a roadside charge of $5.00 per bale for 1300 pound bales. For growers using their own equipment, see Table 10. Yields. The crop is assumed to yield a total of 10.00 tons of hay per acre at 90 percent dry matter (DM) per year. In this study 9 tons is harvested as hay (90% DM) and 3 green tons (30% DM) or 1-ton hay equivalent, is harvested as haylage. Annual yields range from 8 to 13 tons of hay per acre in this region. In this study, yields are calculated as the same for each cutting, but most often the first and second cuttings are the largest and the mid-summer cuttings have the lowest yield.