

Establishing Excellent Stands in Early Fall Using Flood or Sprinkler Irrigation

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Abstract. Controlled climate experiments and replicated field trials indicate that September is an optimum time for planting alfalfa in the San Joaquin Valley. Growers have successfully established stands at that time of year using flood or sprinkler irrigation or by planting to moisture.

Key Words: date of planting, stand establishment, flood irrigation, sprinkler irrigation, planting to moisture

Although there are exceptions, traditionally, most alfalfa in the San Joaquin Valley has been planted in the late fall to early spring months. Aside from crop rotations which limit planting times, a major reason for this timing is to take advantage of winter and spring rains to germinate the crop. However, it is possible to establish a stand with sprinkler or flood irrigation at other times of the year so the questions come up, "When is the best time to plant alfalfa?" and "How can I do it?" The impact of planting date and methods to successfully establish a stand at the optimum planting time are covered in this paper.

Research by Dr. Larry Teuber from the University of California, Davis, evaluated the impact of temperatures and day length on alfalfa seedling growth and development. He found that the optimum temperature for roots in the first month of growth is 69-76° F, depending on the dormancy of the alfalfa variety. In the second month of growth, the optimum temperature for root growth is 72° F while the optimum range for shoot growth is 72-76° F. In the San Joaquin Valley, these temperatures occur in mid-September and from late April to early May. Dr. Teuber's work also showed that day length affected alfalfa seedlings. Daylight for more than 12 hours (which occurs here from March 21 to September 22) favors shoot development while day length less than 12 hours (from September 23 to March 21) promotes root growth more than shoot growth. In short, temperature and day length factors indicate that mid-September planting and emergence should be optimum for alfalfa stand establishment in the San Joaquin Valley.

Do these predictions on the best planting time reflect results obtained under field conditions? Several replicated field trials have indicated that they do.

Carl Schoner, then Farm Advisor in Yolo County, initiated a date of planting study in 1977 (see Table 1). First year data showed a yield advantage of almost 4 tons the first season for the September planting compared to the March planting. The October and November plantings, although better than the March date, did not yield as high as the mid-September planting. The early planting yield advantage carried over into the second season.

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Dr. Schoner initiated a second study in 1978 (see Table 2). His experiences were typical of those of many growers. The September planting emerged rapidly and made a perfect stand. The October planting had crusting problems due to winds, which made it necessary to sprinkle twice. The late November planting had some frost injury and grew very slowly. The February planting was killed by too much rain. Conditions were warmer in March and a good, dense stand was established. Yield advantages of the September planting over later plantings were even more pronounced than in the previous trial. The September planting yielded almost 9 tons in the first season, compared with only four from the spring planting. In the second year the other planting dates caught up in tonnage, but there was still a yield advantage from early planting compared to a November and March planting of 2.7 and 4.6 tons per acre respectively when the yields from the first two years are combined.

A similar study was planted in 1979 at the West Side Research and Extension Center in western Fresno County (see Table 3). There was a 3-ton yield advantage for a September planting date compared to either a December or April planting in the first year. Over the combined yields for the first two years, the September planting produced 4.5 tons/acre more than either the December or April planting. It also yielded over 2 tons/acre more for the combined 2 years than the November planting date.

In a more recent study at the Kearney Agricultural Center (see Table 4), an October 12 planting produced almost 4 more tons/acre than a February 23 planting. Yields were not taken in the second year.

Data from these trials strongly support September and early October as optimum times for establishing an alfalfa stand in the San Joaquin Valley. An additional consideration is that a September planting results in seedlings large enough in November, December, and January, when winter weeds are growing vigorously, to undergo herbicide applications. Another plus for early plantings is that the weather is more predictable than later in fall and during winter. All this leads to the question: "How can a grower achieve successful stand establishment at a time of the year when rainfall is not expected and other methods of getting water to the seeds are required?"

Growers in Stanislaus and elsewhere have had success with flood irrigating up alfalfa on both sandy and heavy soils and with sprinkler irrigation. Following are their prescriptions for success.

Flood irrigation on sandy soils. Flood irrigating up alfalfa in the early fall is a common practice on the sandy loam to loamy sand soils of the east side of Stanislaus and Merced counties. A laser leveled field is important in order to avoid high spots. The ground is commonly deep ripped, disked, and, if fluffy, rolled before planting. Seed is usually broadcast or billion seeded, followed with a ring roller or light harrow. Seed should be planted shallow (1/4 to 1/2 inch) for rapid emergence before crusting occurs. Despite large heads of water (up to 16 cfs), washing of seed is usually minor except right next to the valves. Water should drain off within a few hours. Germination and emergence take only a few days in mid-September, and it is rare to fail to obtain a perfect stand. Growers often try to apply one or two additional irrigations before the rains take over. Growers' experience is that they get production equivalent to a second year stand in their first year.

Hazards with flood irrigating up alfalfa on a light soil include unlevel fields with high spots where water doesn't reach to germinate the seed. Levees and high spots will germinate either with the second irrigation or with winter rainfall. Another concern is planting into fields with heavy pressure from summer weeds such as pigweed or johnsongrass. This problem can be reduced by running Eptam (EPTC) in the initial irrigation.

Warm soil temperatures are critical for success because germination will occur before the soil dries out enough to hinder emergence. It will take at least one, preferably two irrigations to keep the stand going until the fall/winter rains take over. With these subsequent irrigations, it is very important not to have standing water for more than a few hours.

Flood irrigation on clay soils. Alfalfa on clay soils can also be flood irrigated up, but it takes excellent management to prevent crusting, seed washing, and soil sealing. Where it has been done successfully, growers prepare a fine, perfectly leveled seedbed with very small (grape sized) clods. Seed is broadcast or brillion planted and covered with a ring roller. Seed should be planted shallow, 1/4 to 1/2 inch, for rapid emergence before crusting. Runs should be short, 1/4 mile or less with 50 foot wide checks and 1/10 fall. The most important factor is having a drain with sufficient capacity to immediately carry off excess water, and to prevent water from backing up into checks previously irrigated. It is also important to plant early enough in the fall so that a stand is well established prior to the first heavy rainfall because pounding rain can cause crusting which will prevent seedling emergence. In addition, areas where seedlings stand in puddled water will die out. The second irrigation should be delayed as long as possible to avoid washing out young plants around the valves.

Sprinkler irrigation. Most growers prefer sprinkling up alfalfa on clay soils because they find it easier to get a perfect stand. At current hay prices, the cost of renting sprinklers (around \$60 per acre for pipe and pump), plus the cost of water, labor, and diesel fuel for the pump, can be justified in view of the extra production from early planting. A system which can deliver a fine mist may be needed to avoid crusting. Growers will deep rip, disk, and leave the soil quite cloddy before broadcasting seed. Some growers feel golf ball to baseball sized clods help protect seed from frost and wind. Others prefer a fine seedbed for a more uniform stand. Seed is often left uncovered, allowing clods to melt over the seed. Sometimes a ring roller is used after broadcasting. Sprinklers are run long enough to completely fill the soil profile, and run times will vary depending on residual soil moisture content following the previous crop. Sets that are too long can cause puddling, and often there is no stand in the puddles. One more irrigation may be necessary before the rains take over.

Many field crop growers have little or no experience with sprinklers. The first step is to visit a reputable company that rents them to determine your costs. You will need to know the number of acres you wish to irrigate, if you will need to rent a booster pump or if you have one, if you will be using ditch or well water, and the flow rate of your well or the capacity of the ditch. If sprinklers are to be used only to establish the stand, a hand move system is probably the best choice. Inspect the pipe before starting, looking for holes or corrosion. Also check the heads and nozzles to be sure they are all the same size and in working order. Make sure the seals are good. Once the sprinklers are going, check the pressure at the end of the laterals. If the pressure isn't right, which could be due to leaks, improper heads, or too much sprinkler line, the water