



# Arizona Cooperative Alfalfa Forage Yield Trials (1993-2020)

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## Excel File

The Arizona Cooperative Alfalfa Forage Yield Trials (1993-2020) results have been placed in an Excel workbook and can be accessed online [here](#). This Excel workbook contains a worksheet that describes the trials, a worksheet that summarizes all trials, and worksheets for each trial with individual harvests.

## Background

The Arizona Cooperative Alfalfa Forage Yield Trial Program, administered by the Arizona Agricultural Experiment Station and Arizona Cooperative Extension, conducted alfalfa forage yield trials at the University of Arizona's Agriculture Centers in Maricopa and Tucson. The Maricopa location is at 1188 ft elevation and has a sandy loam soil. The Tucson location is at 2352 ft elevation and has a very fine sandy loam soil. Very non-dormant cultivars are well-adapted to this environment, which is typical of agricultural areas of the low elevation deserts of Arizona where 8 to 10 harvests of alfalfa are common each year and stands typically remain productive for 2 to 4 years. All fields were laser-leveled and alfalfa was irrigated using the border-strip methods.

## Protocol

Alfalfa varieties and experimental lines were solicited from and provided by private seed companies and public varieties (CUF 101 and Lew) were included as checks. We usually planted in October, but there were exceptions (Table 1). The experimental design was a randomized complete block with four replications and an average of 24 entries, but some studies had as few as 11 entries and others as many as 46 entries (Table 1). The seed was sown into five rows spaced 6 inches apart with a single row hand

planter at a rate of 20 pounds of seed per acre (7.5 g/plot). The plots were 3 ft wide by 12 ft long. Irrigation water was usually applied the same day as planting or shortly thereafter to germinate the seed. Irrigations of about 4 to 6 inches each were applied at an interval of twice per cutting. The plots were cut with a sickle-bar mower with a 40-inch cutting bar, the forage was raked, placed on a tarp, and weighed with a hanging scale suspended on a tripod. The cutting interval at the peak of the season was 4 weeks. The plots were not subjected to insect pressure severe enough to warrant chemical control. No herbicides or fertilizers were applied. Final plant density (stand) was estimated at the end of the season by counting crowns from two 3 ft<sup>2</sup> areas in each plot after the last harvest. The trials were conducted for two harvest years in most cases and sometimes a few harvests were obtained in the third harvest year.

## Data analysis

The yield estimate from the studies through 2002 were calculated from the arithmetic mean and the least significant difference (LSD) was calculated using the experimental error using a fixed effect model for block. For the studies conducted after 2002, a mixed-model analysis was used with block as a random effect with nearest-neighbor yields as a covariate (see Casler, M.D. 1999. Spatial variation affects precision of perennial cool-season forage grass trials. *Agron. J.* 91:75-81). Least-squares means from the mixed-model analysis are used as the estimate of yield instead of arithmetic means as used for years before 2002. The estimate for the residual is used to generate the least significant difference value reported. The total yield reported in all studies is not necessarily the sum of the individual cutting yields due to rounding errors, or in the case of nearest neighbor analysis, differences in least-squares means estimates.

## Yield

The yield is expressed in units of tons hay / acre adjusted to 12% moisture and was calculated assuming the fresh forage had a moisture content of 80%. These trials did not receive any traffic from hay making equipment since the plots were cut with a small mower and forage removed from the plots by hand. Due to the lack of hay equipment on the plots, we were able to avoid soil moisture dry-down and crop moisture stress normally required to avoid soil compaction from harvest traffic. Therefore, the yields reported are higher than what might be expected in commercial practice.

Table 1. Description of trials for the Arizona Cooperative Alfalfa Forage Yield Trials (1993-2020).

Maricopa 1993-95	22	18-Feb-93	7-Jul-93	27-Jun-95	17
Maricopa 1995-97	27	15-Feb-95	25-Jul-95	20-May-97	19
Maricopa 1997-99	29	11-Oct-96	4-Mar-97	20-May-99	15
Maricopa 1999-00	46	29-Oct-98	15-Apr-99	30-Nov-00	15
Tucson 2001-03	25	19-Oct-00	21-Mar-01	2-Jul-03	20
Tucson 2003-04	19	10-Oct-02	22-May-03	11-Nov-04	15
Tucson 2005-06	12	5-Nov-04	25-Apr-05	20-Nov-06	15
Tucson 2007-08	20	19-Oct-06	17-May-07	16-Dec-08	15
Tucson 2009-10	23	2-Oct-08	10-Apr-09	16-Dec-10	15
Tucson 2011-12	26	28-Oct-10	16-Jun-11	6-Dec-12	14
Tucson 2013-14	24	12-Mar-13	15-Jul-13	11-Dec-14	14
Tucson 2015-16	30	16-Oct-14	12-May-15	15-Sep-16	14
Tucson 2017-18	15	13-Oct-16	30-Mar-17	13-Dec-18	17
Tucson 2019-20	11	1-Nov-18	5-Apr-19	16-Dec-20	17



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