TABLE 2. YIELDS AND LODGING OF SEVERAL FORAGE SORGHUMS WHEN CUT IN THE SOFT DOUGH STAGE OF MATURITY. IMPERIAL VALLEY 1960

Varieties	Tons/acre at 70% moisture			% Lodging	
	First cutting	Second cutting	Total	First cutting	Second cutting
Brawley	37.3	17.6	54.9	1	3
Lindsey 101F	21.6	29.7	51.3	0	8
NK 300*	16.9	30.9	47.8	0	0
DeKalb FS1a*	17.0	29.3	46.3	0	0
DeKalb FS-22	29.1	16.2	45.3	55	49
Hegari*	17.9	26.7	44.6	0	0
Sila King	28.5	13.8	42.3	47	55
Atlas	24.9	15.8	40.7	0	60

* Dual purpose forage sorghums.

and southern San Joaquin Valley, this temperature usually occurs between March 1 and April 1. In the Sacramento Valley this may not occur until April 15 to May 1.

Fertilization

Most California soils require high rates of nitrogen fertilization to achieve maximum yields. Other fertilizers should be added in areas where nutrient deficiencies are known to occur. Although the crop can stand periods of moisture stress, best yields can be expected where water is adequately supplied.

Hybrid forage sorghums of the dual purpose or intermediate types should be cut for silage at the milk-to-soft-dough stage of kernel development. Tall-growing types should be harvested at bloom-to-milk stages to avoid lodging. The sudangrass-sorghum hybrids should also be harvested at the bloom-to-milk stage to avoid harvest problems created as the increasing grain weight causes the stalks to bend or break.

Because the hybrid forage sorghums and sudangrass-sorghum hybrids are often ensiled at high moisture content, as in the case of harvest at bloom stage, a preservative may sometimes be necessary to insure the production of high quality silage. Prussic acid, which at times can be a problem when these crops are used for pasture or green chop, does not present a problem when sorghums are used for silage.

John D. Prato is Extension Agronomy Technologist, Vern Marble is Extension Agronomist, Dale G. Smeltzer is Assistant Professor and Assistant Agronomist in the Experiment Station, University of California, Davis, and George F. Worker, Jr., is Associate Specialist in Agronomy and Supt., Imperial Valley Field Station, El Centro.

L. R. JEPPSON

Weather Influences on use of Acaricides for Citrus Mite Control

Climatic and weather conditions directly affect the necessity for mite treatment in citrus, the number of applications needed per year, the type of application required and the effectiveness of acaricides used. The property of acaricides to be translocated is less advantageous, even for foliage applications, when made during the cooler periods of the year. Seasonal changes of the host and the direct or indirect influence of weather on the mite and the host are essential factors determining mite control and treatment scheduling under California conditions.

FAILURE TO OBTAIN the expected control of a mite infestation from an application of an acaricide is often attributed to application techniques, resistance or inferior batches of the acaricide. Acaricide treatments that are more effective than was expected are perhaps as frequent, but often go unnoticed. These differences can sometimes be attributed to the presence or lack of predators. Another important factor considered was the effect of weather on the need for or efficiency of control applications.

None of the six major mite pests of citrus in California are distributed throughout all the citrus growing areas. Differences in average temperatures among the different citrus districts do not appear to be sufficient to limit the development of any of these mite species. Extreme weather conditions, however, may be a major factor in limiting the damage caused by the pest—and perhaps distribution. Citrus bud mite, citrus rust mite, and the six-spotted mite, for example, are pests only in the coastal districts. Frequent occurrences of hot dry winds in the interior areas prevent injurious populations of these pests from developing, whereas, in coastal districts, longer intervals between such adverse conditions permit the development of injurious populations.

Although the citrus red mite populations are influenced by such conditions, injurious infestations occur throughout the intermediate citrus-growing districts as well as coastal areas. This species, however, has not been found in the desert valleys (Coachella and Imperial). The citrus flat mite is distributed throughout these warmer valleys as well as the San Joaquin Valley and the Yuma mite is restricted to the desert valleys. Factors limiting the distribution of the latter two species are as yet unknown.

Citrus red mite

Lemon trees are considered the most favorable variety for citrus red mite, followed by oranges, whereas grapefruit is infested least frequently. One of the factors contributing to these favorability differences is that citrus red mites lay more eggs on young than old citrus leaves. As a result, the most rapid development of citrus red mite populations occurs during these growth cycles. Green lemon fruits are also more favorable for egg production than the more mature lemon-colored fruit. As lemon trees produce new leaves and fruit most of the year, they provide suitable conditions for mite population increase whenever weather factors permit. Therefore, favorable weather rather than growth cycles generally governs population trends and the necessity for chemical control. Mite populations usually develop rapidly on grapefruit and Valencia orange trees only during the fall and

spring growth cycles. Therefore adverse weather conditions during these cycles may prevent the normal seasonal development of injurious mite populations. Acaricide applications sufficiently effective to protect the new growth may also prevent the development of injurious populations until the next growth cycle.

Mature (yellow) navel orange fruit is more favorable for development of citrus red mite populations than the immature (green) navel fruit. As a result, mite populations frequently increase during the winter as well as the spring and fall. Therefore, in contrast to Valencia oranges and grapefruit it is more frequently necessary to apply mite control treatments to navel oranges during the winter months. Chemical control measures at this time are often ineffective because it is more difficult to obtain spray coverage or adequate spray deposits of the acaricides on the mature fruit. Because mites are less active during the cooler weather, they are also less likely to contact toxic acaricide residues.

In obtaining green lemon fruit for use in laboratory rearing, it was found that fruit taken from the interior districts during the summer was less favorable for mite egg production than similar fruit from coastal orchards. This occurs especially during and following periods of hot, dry, windy weather. Field data indicate that not only the fruit, but also the fully developed younger leaves, were less susceptible to rapid increase in mite populations after such weather conditions have occurred. It appears, therefore, that these weather extremes not only adversely affect mite populations directly but alter the host favorability.

The citrus bud mite *Aceria sheldoni* is primarily a pest on lemons in California. These mites are occasionally found in abundance on oranges, however; the orange bud is small and therefore does not give adequate protection during the adverse hot dry weather conditions that occur occasionally in the coastal districts.

The citrus flat mite is a pest of oranges and tangerines in the San Joaquin, Coachella, and Imperial valleys of California and in Arizona. Only occasionally does severe injury occur in the San Joaquin Valley whereas serious injury to untreated oranges and tangerines usually occurs in the Coachella and Imperial valleys. Warmer weather early in the spring favors population increase when the fruit is young and readily injured by the mites whereas injurious infestations in the San Joaquin Valley are not reached until late summer when less subject to injury.

Sulfur and the dinitrocyclohexyl phenol acaricides are known to be more effective when applied under warm rather than cool weather conditions. Neotran applications resulted in relatively ineffective control when hot weather conditions occurred during and for a few days after the application. Neotran residues are short lived under these hot weather conditions and therefore are not of sufficient persistency to be toxic to the mites which hatch from eggs present at time of treatment. Aramite has notably resulted in poor mite control when applied during rainy or damp weather conditions. Either high humidities or heavy morning dews result in loss of residual toxicity. Ovex and Tedion were influenced very little by weather extremes including rains. Kelthane applications in winter result in effectively reducing mite populations on the leaves but are frequently ineffective on the fruit. Bioassay and chemical studies on residue persistence indicate that the Kelthane is readily absorbed into the oil of the citrus peel and is therefore not available to the mites.

As previously indicated, the adult and nymphal stages of citrus red mite populations are reduced by hot dry winds leaving the remaining population largely in the egg stage. Acaricidal application properly timed following these adverse weather conditions results in more effective control of this mite than is normally obtained. When such extreme conditions occur over an extended period or consecutive periods of such unfavorable weather occur, mite populations may be reduced to below economic levels for a period of several months.

The citrus bud mite remains confined under bud bracts except during its migration to new buds. Major migration periods occur under ideal weather conditions about the time new growth reaches full size. At such times residual-type acaricides applied as mist sprays result in effective control. At other times the spray must wet the buds to contact the mites in order to obtain adequate control. This requires full-coverage-type application.

This is a report of experiments and observations of acaricides used for control of citrus mites. The discussions of materials used and timing of application are not to be considered University recommended practices. For recommendations on mite control problems in citrus areas, growers should contact their local farm advisor.

L. R. Jeppson is an Entomologist in the Experiment Station, University of California, Riverside.

TANOAK

AND SHRINKAGE

H. RESCH · B. A. ECKLUND

ABOUT TWO BILLION board feet of tanoak (*Lithocarpus densiflorus*) saw timber is available in California. The wood of California's tanoak exhibits outstanding strength properties and pleasant appearance. However, its commercial use depends on the proper approach to seasoning. The general interest of the State's lumber industry as well as specific production problems in the manufacture of heavy industrial flooring made desirable these investigations of shrinkage and drying methods for green or partially air-seasoned 5/4-inch lumber—as well as investigating the merits of predrying as a means of accelerating the evaporation of free water from wood.

Previous studies have indicated that air seasoning of tanoak lumber to below 20% moisture content, followed by kiln drying, will give optimum results. However, observations made on the drying rate of lumber kept in air seasoning yards located in the coastal areas of California made it apparent that air seasoning during fall, winter, and early spring progressed too slowly to secure continuous production without keeping an extremely large lumber inventory. It was doubtful whether the moisture content of the stock could come even close to the fiber saturation point within an eight month period.

In the Central Valley, on the other hand, air seasoning during the summer months resulted in severe down grading from checking, splitting, and collapse. Dark colored wood, appearing in the lumber as areas of discoloration and irregular shape, was found to check and collapse much more readily than bright colored wood. Many of these defects occurred after a relatively short time of a few days to a few weeks. After taking all these observations into consideration