

VARIETAL CHARACTERISTICS IN ALFALFA,
THEIR CLASSIFICATION AND USE IN CHOOSING VARIETIES OR BRANDS
FOR SPECIFIC USES AND LOCATIONS

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GENERAL COMMENTS

In this age of wrinkled, pitless prunes and cough syrups that make good husbands, the layman who is frequently the consumer, is meeting a barrage of advertising so intense that it is unequaled by anything in recent history. It is not the purpose of this paper to criticize our advertising industry because advertising has become an integral part of the economy and our free enterprise system. Each and every one of us attending this symposium owe our livelihood and high standard of living either directly or indirectly to the system of free enterprise.

The modern California alfalfa grower is offered over 35 varieties or brands for sale. The ever-increasing number of new alfalfas made available is creating a much more healthy atmosphere for growers since he is now able to select for type, dormancy, and resistance to specific destructive alfalfa pests. This choice is much different from the past when only the Chilean, commons, and very few other varieties or land races were available. Although these alfalfas were very good in their day, it is not realistic nor practical to plant them today because of their extreme susceptibility to the spotted alfalfa aphid. Hence, it would be commendable if both public and private field testing programs would refrain from testing old spotted aphid susceptible varieties because of the mere mention of a name will remind the grower of the glories of the past.

Since it has been established that many varieties and brands exist for use in California, it would be appropriate to elaborate on what a variety really is. A recognized new variety is one which is different and hopefully, superior in one or more characteristic than those which are available on market. Varieties are sometimes sold as brands, but a brand need not be a variety. Differences could be in characteristics not covered in this paper.

Alfalfa breeding is new. Only about 30 years ago in 1942, the variety "Ranger" was introduced to help combat bacterial wilt in the Midwest. It was not until the 1950's when alfalfa breeding was refined and alfalfa research was well under way. Nearly every alfalfa breeder will admit that the true potential and all characteristics of a new variety is not known until several years after its release. We are finding out new good things about our new varieties every day. This does not imply, however, that the new varieties are not adequately tested prior to release. All reputable companies will test new varieties as thoroughly as possible prior to release.

During the past 10 to 20 years of intensive alfalfa research, we have learned much about this crop, but much more must be known before further advances can be made. Some of the major pests of alfalfa have been identified, but all problems have not been isolated. It has been demonstrated that the combined effect of two diseases is worse than the added effect of the two diseases taken singly (synergism). What then happens if 3, 4, or more minor pests attack a plant system simultaneously? We cannot be sure.

The characteristics of alfalfa are many and all known traits cannot be presented in the time allowed. Therefore, only a few major characteristics will be covered. The characterization of the alfalfas in this report is not final since certain members of the National Alfalfa Conference are undertaking a program to characterize all varieties to specific pests. Reports of their findings will probably be made available as the tests are completed.

The characteristics of the specific varieties or brands named in this paper were obtained from a responsible source within the organization which developed the alfalfa variety or brand. Most claims had been documented by letter at the time the manuscript was prepared.

GENERAL CHARACTERISTICS OF ALFALFA

Dormancy

This characteristic is believed to be controlled by a temperature — day length interaction. Semi-dormant varieties such as Lahontan will tend to stop producing forage earlier in the fall and commence growing later in the spring than non-dormant alfalfas in

the Moapa class. Dormant alfalfas will also require longer intervals between harvests. Dormancy is a desirable characteristic in the northern part of California and at higher altitudes, but of much less importance in the southern portion and lower desert areas. The dormancy of each variety is listed on Table II.

Recovery After Harvest

Rapid recovery after cutting is a characteristic of many non-dormant alfalfas. Fast recovery can be advantageous in soilage (greenchop) operations, but detrimental in cubing and sometimes haymaking since the tall regrowth interferes with these processes. More important, the regrowth is crushed by the heavy equipment and continued trampling at each harvest can kill a stand. Windrows and bales left too long in the field can smother and scald the plants underneath.

Leafiness

The characteristics of leafiness or the ability to hold leaves is recognized as an asset in haymaking and "the sticking quality" in cubing. Since the maturity of the alfalfa at harvest and management after harvest could reflect on this trait, it will not be discussed further until more critical data is available.

Yield and Stand Longevity

The characterization of varieties as to yielding ability and stand longevity will not be attempted because these are a function of innumerable factors.

VARIETAL REACTION TO MAJOR PESTS

The major pests listed below and in Table III were chosen on the basis of its seriousness in stand depletion or severe economic loss. Other researchers may have selected one or two others, but most probably would have included a majority of the following.

Insects

Spotted alfalfa aphid (Therioaphis maculata) is an omnipresent insect pest in much of the southwestern United States. A new virulent biotype, Ent F, was reported by Dr. W. F. Lehman in 1969 and later confirmed by Dr. M. W. Nielson at Tucson, Arizona. Presently, Ent F is confined to the Imperial Valley. Some of the old "resistant" varieties have been found to be susceptible to this new biotype.

Pea aphids (Macrosiphum pisi) normally attacks alfalfa fields in the late summer and fall months. Severe stunting and economic loss in low yields and chemical applications will result when infestations are severe and when the varieties are susceptible (Table I). Many biotypes, or races of other pea aphids are in existence. If a variety is resistant to one biotype, it should be resistant to many other biotypes. The pea aphid is also a vector (carrier) transmitting the alfalfa mosaic virus from infected plants to uninfected plants.

Table I: Effect of Pea Aphids on Alfalfa Yield
1968 Bakersfield Data
Yield Before, During, and After Pea Aphid Attack
Expressed as Percent of Experimental Mean of 32 Varieties

Variety	Before PA During PA After PA			Classification
	7/31/68	9/7/68	10/16/68	
WL 504	129	130	130	Moderately Resistant
WL 508	120	142	127	Resistant
Moapa	116	91	106	Susceptible
Sonora	106	98	113	Susceptible
Mesa Sirsa	87	89	91	Susceptible

Alfalfa weevil (Hypera postica) has been reported in the area around Sacramento as early as 1932. Later, the Egyptian alfalfa weevil (H. brunneipennis) appeared in the Imperial Valley, the southern coastal regions, and has progressed northward up the San Joaquin Valley. Complete eradication is not possible with present knowledge or with

"resistant varieties". Control of this insect will necessitate the following:

1. General cleanup of debris in and around alfalfa that the alfalfa weevil requires for summer aestivation. The alfalfa weevil is susceptible to high temperatures and seeks shaded areas during extreme heat.
2. Plant the best variety for your specific farm. No resistance is presently offered in any variety adapted to most of California.
3. Good management should be practiced to keep the alfalfa in good, vigorous health. Such fields will sustain an infestation much better than poor fields.
4. Encouragement of parasites and predators. Studies in other weevil-infested areas have shown that up to 95% control was possible by using parasitic wasps (Bathyplectis spp.)
5. Chemical controls should be specific so that the predators and parasites will not be endangered. Highly toxic broad-spectrum insecticides should be avoided.

Diseases

Phytophthora root rot is a fungus disease associated with wet soil conditions. The causal organism is Phytophthora megasperma. Infected roots rot off completely below the soil surface and the plants can be pulled out easily. Fields being continually plagued by severe Phytophthora root rot infections probably should not be planted with alfalfa. A few new varieties offer some form of resistance to this problem.

Southern anthracnose (Collectotrichum trifolii) is a problem during the warm, moist spring months. Black lesions will appear on the stems and, later, the fungus invades the crown tissue. Dead stems can be seen in fields after infection. Some degree of resistance is available in a few varieties.

Bacterial wilt (Corynebacterium insidiosum) is distinguished by a stunting and yellowing of the foliage and the typical "yellow ring" in a cross-sectioned root. This disease is considered as unimportant in California by some but it is believed to be one of the factors detrimental to stand longevity in many parts of California.

Many other plant pathogens exist in California soils. For further information, consult Diseases of Alfalfa of California, circular 485 which is available through your extension service.

Nematodes

Stem nematode (Ditylenchus dipsi) is a problem in coastal regions, the Antelope Valley, and a few other areas of California. The symptoms shown on infested plants are a severe swelling and stunting in stem terminals and crown regrowth, brittle stems which break off much more easily than the healthy stems and a general crown erosion following severe attacks. A few resistant varieties are currently available.

Root knot nematodes (Meloidogyne hapla, M. javanica, and/or M. incognita acrita) are a persistent problem on moist sandy soils in California. Symptoms are a severe stunting and yellowing of the foliage, a general loss of stand, and hairy clusters (galls) on the tips of secondary roots. Although some tolerance is available in several varieties, less frequent and more thorough irrigation appears to be a better method of control. Several excellent host crops are cultivated in California. Such crops should not precede alfalfa in fields with a history of root knot nematodes.

USES

Most varieties have been designed for use in all four categories, as shown in Table II, i.e., hay, soilage, dehydration, and cubing. These terms can be generally defined as follows:

Hay — Forage which is mowed, field cured in windrows and usually stored in the form of bales.

Soilage — Mechanical harvesting and daily feeding of green forage directly to animals. Normally referred to as green chop in California.

Dehydration — Alfalfa hay harvested green and rapidly dried with artificial heat preserving nutrients and leaves. Usually stored in the form of pellets.

Cubing — Alfalfa hay which is mowed, windrowed, field-cured, and stored in the form of high density cubes.

Haylage — Alfalfa hay mowed, windrowed, and dried to semi-wilt, (about 65% moisture) then stored in a silo. This is not practiced to any great extent in California.

LOCATIONS

The areas of adaptation listed in Table II are general. It is highly possible that some varieties listed can be utilized in local areas not included within the broad regions. Similarly, some varieties may not be adapted to a local condition within the broad area of adaptation. If you are not certain about the use of a specific variety or brand for use on your farm, consult your local seed representative or the extension service for advice.

CONCLUSION

In spite of vast problems present in alfalfa production, the California Farmer has numerous varieties and brands to choose from. Industries' role in developing and supplying the bulk of these is indeed commendable. It is hopeful that all major varieties and brands used in this state have been included.

TABLE II

<u>VARIETY OR BRAND</u>	<u>DORMANCY^b</u>	<u>USES^c</u>	<u>ADAPTED AREAS^d</u>	<u>COMMENTS</u>
Abunda Verde	ND	1,2,3,4	2*,3*,4,5	None
AS 13	MND	1,2,3,4	2,3,4,6	Provides stand longevity
AS 49	SD	1,2,3,4	2,3,6	Resistant to downy mildew, stand longevity
AS 63	D	1,2,3,4	1	Winter hardy, stand longevity fine stems
Caliente	ND	1,2,3,4	4,5	Tolerant to downy mildew, good recovery
Caliverde 65	SD	1,2,3,4	2,3,6	None
Condura 72 Brand	SD	1,2,3,4	1,2,3,7	High forage yield - high leaf stem ratio--resistance to downy mildew
Converde 94 Brand	ND	1,2,3,4	2,3,4,6	Resistance to root knot nema- tode & downy mildew
DeKalb 123	D	1,2,3,4	1	None
DeKalb 153	SD	1,2,3,4	1	None
DeKalb 167	SD	1,2,3,4	2	Plant on tough soils with phyto- phthora
DeKalb 183	ND	1,2,3,4	2,3	Do not plant in Imperial Valley
El Unico	ND	1,2,3,4	4,5	Not too much planted in Imperial Valley
Eureka	D	1,4	1,2,3,7	For long rotations and tough soils
Hayden	ND	-----	-----	None
Imperial 70	ND	1,2,3,4	2,3,4,5	Soilage & hay on sandy soils in the San Joaquin Valley & Sacramento Valley
Joaquin 11	SD	1,3,4	1,2,3,4,5,6,7	None
Lahontan	SD	1,3,4	1,2,3,7	Plant on heavy soils & for stem nematode
Mesa Sirsa	ND	1,2,3,4	4,5	None
Moapa	ND	1,2,3,4	2,3,4,6	Do not plant in Imperial Valley
Moapa 69	ND	1,2,3,4	2,3,4,6	None
N 71 Brand	ND	1,2,3,4	3,4,5	Fast recovery, high yields

TABLE II (cont.)

<u>VARIETY OR BRAND</u>	<u>DORMANCY</u> ^b	<u>USES</u> ^c	<u>ADAPTED AREAS</u> ^d	<u>COMMENTS</u>
N 78 Brand	SD	1,2,3,4	2,7	Good fall and spring growth
Resistador	SD	1,2,3,4	1,2,3*,4*,5*	None
Sonora	ND	1,2,3,4	4,5	Requires well-drained soils
Sonora 70	ND	-----	-----	None
Thor	D	1	1*	None
WL 214	D	1,2,3,4	1	None
WL 305	D	1,2,3,4	1	Tolerant to downy mildew
WL 306	SD	1,2,3,4	1	Tolerant to downy mildew
WL 450	MND	1,2,3,4	2,3,4,6	Tolerant to downy mildew
WL 451	MND	1,2,3,4	2,3,6	Tolerant to downy mildew
WL 501-R	ND	1,2,3,4	2,3,4	Tolerant to downy mildew
WL 504	ND	1,2,3,4	2,3,4,5	Tolerant to downy mildew
WL 508	ND	1,2,3,4	2,3,4,5	Resistance to downy mildew
819 Brand	ND	1,2,3,4	2*,3,4,5	None
919 Brand	ID	1,2,3,4	2,3,4*,5*	None
10-19 Brand	SD	1,2,3,4	1,2,3,4*,5*	None

* = Areas of minimum useage

b = Dormancy

ND = Non-dormant

MND = Moderately non-dormant

ID = Intermediate dormant

SD = Semi dormant

D = Dormant

c = Uses

1 - Hay

2 - Silage

3 - Dehydration

4 - Cube

d = Location

1 - Northern California and/or mountain areas

2 - Sacramento Valley

3 - Northern San Joaquin Valley

4 - Southern San Joaquin Valley

5 - Imperial Valley and low desert

6 - Coastal area

7 - High desert

TABLE III
REACTION TO INSECTS AND DISEASES^a

VARIETY OR BRAND	Spotted	Phytophthora				Bacterial Wilt	Stem Nematode
	Alfalfa Aphid	Pea Aphid	Root Rot	Southern Anthracnose			
Abunda Verde	R	---	---	---	---	---	---
AS 13	R	---	T	---	R	ST	
AS 49	R	---	T	---	R	T	
AS 63	---	---	---	---	R	---	
Caliente	R	---	---	---	T	---	
Caliverde 65	HR	---	---	---	R	T	
Condura 72 Brand	R	T	R	---	R	R	
Converde 94 Brand	R	T	---	---	---	---	
DeKalb 123	---	---	---	---	R	---	
DeKalb 153	---	---	---	---	MR	---	
DeKalb 167	R	R	HR	---	R	R	
DeKalb 183	R	---	T-MR	---	MR	---	
El Unico	R	---	---	---	---	---	
Eureka	R	R	R	---	R	R	
Hayden	R	no	data	for	California	---	
Imperial 70	R	R	T	---	T	---	
Joaquin 11	R	R	R	---	T	T	
Lahontan	R	---	T-MR	---	R	R	
Mesa Sirsa	R	---	---	---	---	---	
Moapa	R	---	ST	---	ST	---	
Moapa 69	R	---	ST	---	ST	---	
N 71 Brand	R	T	---	---	---	---	
N 78 Brand	R	T	MT	---	T	MR	
Resistador	MR	T	---	---	T	T	
Sonora	R	---	---	---	---	---	
Sonora 70	R	no	data	for	California	---	
Thor	---	---	---	---	HR	---	
WL 214	R	---	---	---	R	---	
WL 305	T	T	---	T	R	---	
WL 306	R	R	---	T	R	---	
WL 450	R	MR	ST	T	MT	R	
WL 451	R	T	T	MR	R	ST	
WL 501-R	R	MR	ST	T	T	ST	
WL 504	R	MR	---	T	ST	---	
WL 508	HR	R	---	MR	ST	---	
819 Brand	R	---	ST	---	ST	---	
919 Brand	R	---	T	---	R	T	
10-19 Brand	R	MT	MR	---	R	R	

The writer assumes responsibility only to the extent of accuracy in which the reported data is recorded.

- a - HR = Highly resistant Resistant - Little economic damage
 R = Resistant Tolerant - Moderate economic damage
 MR = Moderately resistant Susceptible - Severe economic damage
 T = Tolerant
 MT = Moderately tolerant
 ST = Slight tolerance
 --- = Susceptible or no data available

Note: Complete resistance or immunity will not be found in a crop that is a natural host to a specific organism.

TABLE IV

<u>VARIETY OR BRAND</u>	<u>ORIGINATOR</u>	<u>INFORMATION SUPPLIED BY:</u>
Abunda Verde	Northrup King	Bill Vaccaro
AS 13	Ferry-Morse Seed Company	Ed Beyer
AS 49	Ferry-Morse Seed Company	Ed Beyer
AS 63	Ferry-Morse Seed Company	Ed Beyer
Caliente	Ferry-Morse Seed Company	Ed Beyer
Caliverde 65	University of California	Vern Marble
Condura 72 Brand	L. Teweles Seed Company	Paul Sun
Converde 94 Brand	L. Teweles Seed Company	Paul Sun
DeKalb 123	Cal-West Seeds	Iver J. Johnson
DeKalb 153	Cal-West Seeds	Iver J. Johnson
DeKalb 167	Cal-West Seeds	Iver J. Johnson
DeKalb 183	Cal-West Seeds	Iver J. Johnson
El Unico	University of Arizona, Tucson	Vern Marble
Eureka	Security Seed	Bill Rusconi
Hayden	University of Arizona, Tucson	Vern Marble
Imperial 70	Security Seed	Bill Rusconi
Joaquin 11	Security Seed	Bill Rusconi
Lahontan	USDA - Reno, Nevada	Vern Marble
Mesa Sirsa	University of Arizona - Tucson	Vern Marble
Moapa	USDA - Reno, Nevada	Vern Marble
Moapa 69	USDA - Reno, Nevada	Vern Marble
N 71 Brand	Arnold-Thomas Seed Service	Marvin K. Miller
N 78 Brand	Arnold-Thomas Seed Service	Marvin K. Miller
Resistador	Northrup King	Bill Vaccaro
Sonora	Southwest Alfalfa Group	Vern Marble
Sonora 70	University of Arizona - Tucson	Vern Marble
Thor	Northrup King	Bill Vaccaro
WL 214	Waterman-Loomis Company	Ike I. Kawaguchi
WL 305	Waterman-Loomis Company	Ike I. Kawaguchi
WL 306	Waterman-Loomis Company	Ike I. Kawaguchi
WL 450	Waterman-Loomis Company	Ike I. Kawaguchi
WL 451	Waterman-Loomis Company	Ike I. Kawaguchi
WL 501-R	Waterman-Loomis Company	Ike I. Kawaguchi
WL 504	Waterman-Loomis Company	Ike I. Kawaguchi
WL 508	Waterman-Loomis Company	Ike I. Kawaguchi
819 Brand	Northrup King	Bill Vaccaro
919 Brand	Northrup King	Bill Vaccaro
10-19 Brand	Northrup King	Bill Vaccaro