DIAGNOSING FIELD PROBLEMS

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Overview

Alfalfa is grown across a wide range of soil, water and climate conditions which challenges the management decision of growers to produce the highest quality and high yielding hay. Over the past decade, there has been a shift of alfalfa plantings from some of the fertile soils in the Central Valley to the more marginal soils once thought to be unsuitable for alfalfa. With these changes and the demand for higher quality and increased production, alfalfa growing requires a keen eye and ability to recognize signs or symptoms of problems that can cause significant production losses.

Before one can diagnose field problems effectively, one must understand the requirements necessary for alfalfa hay production. There are several publications/field guides available that will enable growers and industry persons to become familiar with practices required for alfalfa production. A list of suggested references are made at the end of this paper.

Understanding and recognizing problem symptoms will not only help solve the current problems but also avoid future problems of the same order. In most cases, management decisions made to avoid problems are much more successful than are options to correct problems. This is particularly important with perennial crops where preplant operations are carefully considered and plans are well thought out prior to the establishment of the crop.

Techniques in Diagnosing Problems

One should ask for and accumulate as much information as possible from the grower, PCA, and seedsmen on current cultural practices and previous crop practices. Listed is an outline of suggested questions which should be addressed in determining possible cause and effect of field problems.

Pre-field examination survey:

- Previous crop history:
  Health and yield of crop, pesticides used, insect diseases, weed problems and fertilization.
- Soil analysis:
  pH, EC, nutrient level, soil compaction or any subsurface layering that will impede water or roots.
- Irrigation water:
  pH, EC, source and amount applied.
- Variety characteristics:
  Dormancy type, pest resistance and proven yield performance for the area.
- Preplant operations used:
  Ripping, chiseling, leveling, seed bed condition at planting.

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Postplant operations:

Herbicides, insecticides used, limited or excessive moisture during germination, seeding rate and depth of seeds.

Irrigation:

Length of runs (field distance)
Time of sets (hrs/irrigation setting)
Amount of water applied per irrigation (acre ft.)
Depth of water penetration in soil 24 hours following irrigation
Time and location of any standing water
Tail water drainage system used
Number of irrigations applied between cuttings

Harvesting:

Cutting frequency
Cutting height
Equipment traffic and compaction

Field Examination

1. Walk or drive around the entire field. Avoid focusing on one small area only.
2. Observe the field for uniformity of plant height and color. Observe for problems related to soil, water and root disorders.
3. Dig up affected plants carefully, keeping entire root system intact. Pulling plants by hand will break roots or remove nematode galls.
4. Observe both color and firmness of roots.
5. Vertically slice the root and look for internal discoloration.
6. Dissect the crown and observe for discolored or rotted tissue.
7. Evaluate the stems and leaves for abnormal color, insect feeding, spots or lesions.
8. Sweep net an area to determine insect type and population.
9. Observe the soil surface for holes, mounds, live or parasitized insects, white fungal growth, or evidence of standing water.
10. Determine if affected area of field displays a random pattern or mechanical (precise) pattern.
11. Refer to chart for symptoms found.

Summary

To be successful in accurately diagnosing field problems takes an open mind, being objective, being thorough, and years of experience. As part of this paper a field chart has been developed to assist both growers and industry representatives to determine causal agent from plant symptomology. More detailed information on specific problems can be obtained from:

1 UC IPM manual on Alfalfa Hay, #3312, UC Cooperative Extension Office.
2 Compendium of Alfalfa Diseases, APS Press.
3 California Alfalfa Symposium Proceedings. Agronomy Department, UC Davis.

The following publications can be obtained from the Certified Alfalfa Seed Council, P.O. Box 1017, Davis, CA 95617-1017.

4. Alfalfa Analyst
5. Alfalfa for Beef Cows
6. Alfalfa: The Crop For The Soil
7. Alfalfa for Dairy Animals
8. Alfalfa Hay Quality
9. Alfalfa - The High Quality Hay for Horses
10. Buying and Selling Alfalfa Hay
11. Establishing Alfalfa Stands
12. Grazing Alfalfa
13. Improving Alfalfa Forage Quality - How to Detect and Manage the Potato Leafhopper Problem
14. Making Quality Alfalfa Hay in Less Time, With Fewer Risks
15. Manage the Alfalfa Weevil to Improve Alfalfa Yield and Quality
16. Weeds Affecting Alfalfa Quality
17. Alfalfa in the South
18. Alfalfa in the South - slide set and video
19. Western Alfalfa Seed Production Story - slide set and video
20. Annual National Alfalfa Symposium Proceedings
21. Alfalfa Varieties

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ALFALFA
Key to Diagnosing Field Problems

SYMPTOMS	PESTS			
LEAVES				
Leaf skeletonizing	6	7		
Leaf chewed	7	8	12	
Leaf curled, sticky mass	11	13		
Leaf yellowing/veinal	11	23	24	50
Yellow tip, leaf firing	9	37		
Leaf crinkle	10	25		
Yellowing between veins/interveinal	27	46	50	
Small brown/black spots	30	32		
Pale green/grey underside	33			
Tan spots	31			
Tan marginal lesions	38			
Orange spores	43			
Marginal white spots	26	47		
Red margins	9	49		
Dark Bluish/green	15	17	28	48
Leaf strapping/narrow	17	18		
Leaf clasping, stick together	19			
Leaf burning	15	20	21	
Darken, water soaked	16			
Leaf whitening	14	26	29	

SYMPTOMS	PESTS				
ROOTS					
Tap root rotted	42	44			
Tan/black root lesions	39				
Internal vascular redding	35	37			
Internal vascular-yellow/tan	36	41	42		
Root chewed	2	4			
Soft root/putrid odor	14				
Galls on lateral roots	28				
Stubby roots	22				
CROWNS					
Bluish/black, dry rot	40				
Orange/red flecks	38				
Brown/yellow lesions	39				
Dark brown necrotic tissue	45				
STEMS					
Stem & leaf feeding	1	2	3	5	12
Black spots	32				
Wilting/flagging	40	42			
Yellow stunting	37	41			
White mycellium mass	34				
Dead stem buds, swollen internodes	29				
Plant wilt/stem green-taproot brown	37				

VERTEBRATE PESTS, INSECTS, AND ARTHROPODS

1	Squirrels	6	Weevil	11	Aphid
2	Meadow mice	7	Armyworm	12	Grasshoppers
3	Rabbits	8	Alfalfa caterpillar	13	Whitefly
4	Gophers	9	Leafhopper		
5	Deer	10	Thrips		

ENVIRONMENTAL FACTORS AND TOXICITIES

14	Scald	19	EPTC	24	Diuron
15	Salt	20	Buctril	25	Roundup
16	Frost	21	Paraquat	26	Air pollution
17	Moisture stress	22	Balan	27	Abiotic/ non pathogenic
18	2,4-DB	23	Velpar		

NEMATODES AND PLANT DISEASES

28	Root knot nematode	33	Downy mildew	38	Stagonospora crown/root rot	43	Rust
29	Stem nematode	34	Sclerotinia rot	39	Rhizoctonia root canker	44	Pythium
30	Common leaf spot	35	Fusarium wilt	40	Southern anthracnose	45	Fungi complex
31	Stemphylium leaf spot	36	Phymatotrichum root rot	41	Bacterial wilt	46	Virus
32	Spring black stem	37	Verticillium wilt	42	Phytophthora root rot		

NUTRIENT DEFICIENCIES

47	Potassium
48	Phosphorus
49	Boron
50	Nutrition