

TECHNICAL NOTES

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COMPARISON OF FIFTEEN GRASS COVER CROPS EVALUATED AT THE LLOYD CRISP VINEYARD

by

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Cover crops can greatly improve trafficability during the winter months, reduce soil erosion, and reduce between-row maintenance operations in Western Oregon vineyards. Vineyards are typically planted on a south facing slope with the rows aligned north to south. Much of the field work occurs when the soils are wet, muddy, and subject to compaction and erosion. Numerous annual and perennial grasses, legumes, and even plants commonly thought of as weeds have been tried over the years by western Oregon vineyard growers. Legumes are generally unacceptable because they compete for moisture, harbor pests, and require too much maintenance. Weeds are also unacceptable because they frequently harbor or attract rodents and the seeds may spread to other areas. Grasses have performed best in cover crops trials but further trials are needed to determine which species/cultivars may best meet the needs of growers in Washington and Oregon.

The performance of several new and commonly used grass cultivars and grass mixes are summarized in this vineyard cover crop trial report.

METHODS AND MATERIALS

A six acre vineyard (*cv. Pinot noir, Muller-Thurgun & Riesling*) was established in 1985 utilizing a spacing of twelve feet between rows and five feet within. Eleven grass cultivars and three ryegrass - fescue mixtures were broadcast seeded between the rows on April 2 and 3, 1986 (Table 1) at a rate of 25 lb./acre and harrowed. Each seeding was replicated four times in a randomized complete block design with the exception of the three mixtures which were only replicated twice. 'Zorro' annual fescue was seeded on September 3, 1986 using the same procedure. 'Clatsop' creeping red fescue failed to germinate resulting in reseeded on September 3, 1986 to 'Ensylva' creeping red fescue. One hundred pounds of 20-20-20 fertilizer was applied to the cover crop on September 3, 1986.

Data collection occurred from 1986 to 1991. Plant vigor, trafficability, and degree of rodent activity were visually scored. First year stands were visually estimated and scaled on a percentage basis with 100% being ten or more plants per foot and 0% being a complete failure. Percent vegetative cover, surface leaf litter, bare soil, and weed invasion were based on the point-step method of evaluation. The point-step method involves randomly touching a pointer to the ground 100 times within each plot and determining what the pointer is contacting, i.e. vegetative cover, bare soil, weeds or leaf litter. Plants were also measured for total culm height.

Data pertaining to the response of the grapes to the cover crops was not collected in this trial. Moisture stress, reduced light reflectance, and reduced soil temperatures are a few important negative factors associated with cover crops, and must be considered when selecting a cover crop for vineyards. Dr. Ray William, OSU Horticulture Weed Specialist, has suggested that every other row should be seeded to a permanent cover crop which would be used for vineyard traffic.

TABLE 1. Grass cultivars evaluated at the Crisp vineyard cover crop trial.

1. 'Covar' sheep fescue.....	(<i>Festuca ovina</i>)
2. 'Pomar' orchardgrass.....	(<i>Dactylis glomerata</i>)
3. 'CBS II' perennial ryegrass.....	(<i>Lolium perenne</i>)
4. Mecklenberg *sheep fescue.....	(<i>Festuca ovina</i>)
5. 'Zorro' annual fescue.....	(<i>Vulpia myuros</i>)
6. 'Ensylva' creeping red fescue.....	(<i>Festuca rubra r.</i>)
7. 'Elka' perennial ryegrass.....	(<i>Lolium perenne</i>)
8. 'Shadow' chesings fescue.....	(<i>Festuca rubra c.</i>)
9. 'Pennlawn' creeping red fescue.....	(<i>Festuca rubra r.</i>)
10. 'Dorado' chewings fescue.....	(<i>Festuca rubra c.</i>)
11. 'Aurora' hard fescue.....	(<i>Festuca longifolia</i>)
12. 'Durar' hard fescue.....	(<i>Festuca longifolia</i>)
13. 'Elka' + 'Aurora' (80%/20%)	mix
14. 'Elka' + 'Covar' (80%/20%)	mix
15. 'Elka' + 'Ensylva' (80%/20%)	mix

* generic name, not an actual cultivar

RESULTS

Germination for most species occurred the last week of April 1986. Moisture conditions were good following germination and the grasses grew rapidly. Weeds also responded well to the favorable growing conditions and severely infested the plots. Hand roguing was utilized the first year and an application of 'Envy' 2,4-D was made in 1987 to control broadleaf weeds.

Most vehicular traffic occurred during various grape production operations including harvest, weed control within the rows, and pruning. Mowing was required once a year, usually the later part of May. The mowing height was initially quite short which may have stressed some of the cultivars. Most fine-leaf fescues and orchardgrasses should not be mowed less than four inches in order to maintain vigor.

The performance of each cultivar is summarized below and in Table 2.

'Covar' sheep fescue originated from a collection made in Turkey, and was selected for its high seedling vigor and drought tolerance. It is one of the favored cultivars in the dryer regions or Oregon. 'Covar' like most fine-leaf fescues germinates rapidly but establishes slowly. Weed invasion during establishment was a problem in this trial. 'Covar' provided adequate soil protection and withstood traffic very well. It went dormant early each year, usually by mid-June. This may have reduced moisture competition but allowed summer-active weeds to flourish.

'Pomar' dwarf orchardgrass is a short perennial grass originally selected as a cover crop for orchards. Much of its growth occurs early in the spring when soil temperatures are cool. It has a fairly high nitrogen requirement with vigor decreasing rapidly in nitrogen deficient soils. 'Pomar' established very rapidly and provided excellent ground cover the year of establishment in this trial. Weed encroachment was a moderately severe problem with this cultivar. Overall, it performed poorly in comparison to the fine-leaf fescues.

'CBS II' perennial ryegrass and 'Elka' perennial ryegrass did not perform well. 'CBS II' provided adequate cover the year of establishment but the stand deteriorated after a few years. Perennial ryegrasses generally require higher soil fertility than what commonly occurs in Western Oregon vineyards. Furthermore, summer precipitation falls sparingly in Western Oregon which may stress the grass and contribute to stand deterioration.

Mecklenberg sheep fescue is a relative newcomer. It is not a true cultivar but actually an "ecotype" of sheep fescue. Mecklenberg was imported from Europe to help meet the 1985 Farm Bill's Conservation Reserve Program (CRP) high demand for sheep fescue. Mecklenberg performed extremely well in this trial. It was the shortest grass evaluated, provided exceptional weed competition and soil protection and withstood traffic very well. It remained green 3 - 5 weeks later into the summer than 'Covar' which may be undesirable because of the reduced light reflectance and possibly higher moisture competition. Observations of Conservation Reserve Program plantings in eastern Oregon and Washington suggest that it is not adapted to climates receiving less than 30" annual precipitation.

'Zorro' annual fescue is commonly used as a cover crop in California. It provides high light reflectance, early maturity, and low moisture competition. Since it needs annual seeding, mowing must be postponed until after seed set. 'Zorro' performed very poorly in this trial. Vegetative cover was highly variable from year to year, and was dependent on the amount of seed set the prior year and the growing conditions after germination. Erosion protection was marginally acceptable and was primarily provided by leaf litter. 'Zorro' was unable to compete with weeds such as false dandelion (*Hypochaeris radicata*) and the plots were among the weediest of the cultivars evaluated. Rodents favor high amounts of leaf litter and false dandelion, and were in the 'Zorro' plots.

'Ensylva' creeping red fescue is reportedly a shade tolerant, drought tolerant, fast creeping red fescue. Even though 'Ensylva' was fall seeded into failed 'Clatsop' plots, it provided adequate soil erosion protection that winter. 'Ensylva' did not appear to be as aggressive a creeper as 'Pennlawn' creeping red fescue. Weeds made up a large percentage of the ground cover by 1991. Perhaps fall seedings of this cultivar are weedier than spring seedings.

'Elka' perennial ryegrass established very quickly and provided good erosion control the year of establishment. The stand deteriorated rapidly and only 14% of the plot area was covered with 'Elka' in 1991. Vigor dropped significantly in the last two years and the weed population escalated. 'Elka' and other perennial ryegrasses perform better with higher soil fertility making them poorly suited for long-term cover crops in vineyards.

'Shadow' chewings fescue is closely related to creeping red fescue but is nonrhizomatous. 'Shadow' exhibited very good seedling vigor, quick establishment, and the stand improves with age. 'Shadow' was the tallest cultivar tested. A single mowing left considerable amount of leaf litter on the vineyard floor. Although high amounts of leaf litter may improve light reflectance during the summer, it does provide a haven for rodents.

'Pennlawn' creeping red fescue was one of the top performing evaluated in this trial. Rhizome growth enabled 'Pennlawn' to quickly fill bare voids thereby reducing soil erosion and preventing weed invasion. However, rhizome growth into the vine rows could be a problem. Creeping red fescues, unlike many fine-leaf fescues, are tolerant of close mowing which enables vineyard managers to clip the seedheads of shorter weeds. 'Pennlawn' withstood traffic quite well in this trial but creeping red fescues reportedly may not perform well if traffic occurs during peak soil compaction conditions.

'Dorado' chewings fescue performed very similarly to 'Shadow chewings fescue. 'Dorado' provided slightly better vegetative cover, vigor, and fewer weeds than 'Shadow'. 'Dorado' was a little slow to establish but the stand improved considerably with age. 'Dorado' and 'Shadow' remained green longer into the summer than the sheep and hard fescues.

'Aurora' hard fescue performed fair to well in this trial. Hard fescue is closely related to sheep fescue and exhibits very good drought and heat tolerance. A relatively high percentage of bare ground, greater than 10%, occurred between the 'Aurora' plants. 'Aurora' must be very competitive because weed invasion in the void areas was surprisingly low. Although the overall height of 'Aurora' was measured at 16 - 18 inches in this trial, the leaves typically grew less than five inches tall.

'Durar' hard fescue is a 1949 Soil Conservation Service (SCS) release and originated from a seed collection made in Oregon. 'Durar' was selected primarily for its stand longevity and durability, hence its name. It typically is utilized in harsh, dry sites in the intermountain west. 'Durar' performed poorly in this trial. It germinated readily, provided good initial cover, but the stand was inadequate to suppress weed invasion.

'Elka' perennial ryegrass + fine-leaf fescue mixtures should in theory provide very good short and long-term cover. 'Elka' should provide quick cover and die out after a few years; and the slower establishing, more permanent, fine-leaf fescue would fill the voids left by the ryegrass. The mixtures tested did not perform well in this trial. The mixture stands were less than the two cultivars seeded separately. Twenty-percent fine-leaf fescue is insufficient seed to provide long-term cover. Perhaps a better mixture would be 80% fine-leaf fescue and 20% perennial ryegrass.

Table 2. Comparison of fifteen grass cover crops evaluated at a Benton County, Oregon vineyard from 1986 to 1991,

Cultivar	'86 ¹ Stand	1988				1991				Culm Ht (in) ²	Vigor ³ '87-'91	Traffic ³ Tolerance	Rodent ⁴ Activity
		Veg. Cover (%)	Bare Soil (%)	Leaf Litter (%)	Vegetation Cover (%)	Bare Soil (%)	Weeds (%)	Leaf Litter (%)	Weeds (%)				
Covar	VG	31	16	43	38	9	48	4	16	5	7	4	LOW
Pomar	E	25	34	35	40	9	46	5	18	4	5	3	LOW
CBS II	F	26	34	36	22	13	60	4	14	4	8	2	HIGH
Mecklenberg	G	45	15	2	89	2	3	6	10	3	1	3	LOW
Zorro	VG	14	13	11	12	16	61	11	15	3	8	5	HIGH
Ensylva	F	23	33	40	41	7	45	7	17	3	6	4	MED
Elka	F	29	32	37	14	15	66	5	13	3	8	3	LOW
Shadow	G	37	9	52	68	3	16	10	24	4	3	2	LOW
Pennlawn	VG	35	7	0	76	2	10	12	24	4	2	2	LOW
Dorado	F	40	16	3	78	2	13	7	21	4	3	4	LOW
Aurora	G	33	15	47	59	11	19	11	18	5	4	3	LOW
Duraf	G	25	19	6	36	17	39	17	20	5	5	4	MED
Elka + Aurora	F	29	33	4	54	13	25	8	-	-	-	3	MED
Elka + Covar	F	31	29	4	31	12	45	11	-	-	-	3	MED
Elka + Ensylva	F	26	40	2	36	18	27	19	-	-	-	4	LOW

1 E= 90-100% stand, VG= 85-90%, G=80-85%, F=70-80%
 2 Three year average
 3 1= Excellent 9= Very Poor
 4 1991 ratings, LOW = activity in 0-25% of the plots
 MED = activity in 25-50% of the plots
 HIGH = activity in 50-100% of the plots