



Cover crop management in a Chardonnay/99 Richter vineyard in the coastal wine grape region, South Africa. 1. Effect of two management practices on selected grass and broadleaf species

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This study was carried out with the objective of identifying the best weed control practice – best cover crop species and best cover crop management- for vineyards of medium textured soils in coastal regions.

- The authors compared 8 **cover crop species**, including 3 cereals and 5 broadleaf species. The cereals, or grain species, were: 1) rye (*Secale cereale*), 2) ‘Overberg’ oats (*Avena sativa*), and 3) Saia oats (*Avena strigosa*). The broadleaf, N-fixing species were: 4) grazing vetch (*Vicia dasycarpa*), 5) faba bean (*Vicia faba*), 6) ‘Paraggio’ medic (*Medicago truncatula*), 7) ‘Kelson’ medic (*Medicago scutellata*), and 8) subterranean clover (*Trifolium subterraneum*). These species were chosen because they were expected to produce the 8 tons/ha of dry matter considered necessary for the effective control of summer weeds.
- The 2 **cover crop management practices** applied to each of the cover crops species were: 1) annual sowing with full surface chemical control before budbreak (August in the Northern hemisphere), and 2) biannual sowing with full surface chemical control after budbreak, and more specifically, at pea size (November in the Northern hemisphere). That is, in the first case, the cover crop was eliminated early, whereas in the second it was allowed to complete its natural cycle, which allowed for some natural re-seeding. The authors also included two controls in the study: a control without cover crop where the weeds were controlled mechanically in March, and a control without cover crop where the weeds were controlled chemically in March.
- The study was carried out for 10 years (1993-2002). The cover crops were sown annually in early April (October in the Northern Hemisphere). The cover crop also received N, P, and Ca fertilization (see original text for details). The vineyard was irrigated through sprinklers for the first 10 weeks after sowing, and depended on rainfall after that. Rainfall at the research site near Stellenbosch typically ranged from 400 to 600 mm (16 to 24 inches), mostly from May to August (November to February). The vineyard soil had the typical medium texture found in the coastal grape growing region of Western Cape, South Africa (70% sand, 13% silt, 17% clay).
- **Effect of species on dry matter production.** 1) ‘Overberg’ oats was the species that produced the highest long-term average dry matter (meaning the highest potential to compete with weeds). On the other hand, *grazing vetch* and *subterranean clover* produced least dry matter (meaning it is risky to use these species as cover crops with the purpose of combating weeds). 2) The cereal species did not produce additional matter if left to die back naturally. On the other hand, ‘Kelson’ medic, and to a lesser extent the other broadleaf species, produced significantly more dry matter when allowed to complete their cycle. This means that, in order to maximize dry matter production, broadleaf species should be allowed to grow until October (April in Northern hemisphere) rather than be controlled early on.

- **Ability of species to re-establish themselves.** The authors used the change in dry matter late in the season, and the amount of viable seed in relation to the original seeding rate, to estimate the ability of each species to re-seed itself. Even though, in the short term, ‘Paraggio’ medic and grazing vetch showed some potential to re-establish themselves in the short term, none of the species studied was able to consistently re-establish successfully.

- **Ability of species to control winter-growing weeds.** Continuous effective suppression of winter growing weeds was only achieved with the two *oats* species (‘Overberg’ and ‘Saia’) in combination with chemical control before budbreak. The two medics and the grazing vetch were able to control winter weeds in the first three seasons of the trial, but not in later years.

- **Ability of species to control summer-growing weeds.** Long-term effective control of the summer weeds was achieved best with the cereals in combination with chemical control before budbreak. However, the two types of oats, in combination with chemical control at pea-size, should be limited to no more than two consecutive years, since the authors noticed that they allowed weeds to produce seed, leading to a gradual build-up of weed seed population. Control of summer seeds with the broadleaf species was erratic or only effective in the first years.

- Some conclusions from the authors:

- _ *Cereals* were most effective in controlling weeds because of the large production of dry matter, but dry matter decreased after 4 years, indicating that they should be rotated with another cover crop.

- _ among the cereals, *oats* (both ‘Overberg’ and ‘Saia’) are good suppressor of both winter- and summer-growing weeds. For this, they should be established annually, and controlled chemically before budbreak.

- _ Because of its poor dry matter production, *subterranean clover* should not be considered as a cover crop for regions similar to those in this study.

- _ *Faba bean*, *grazing vetch*, and the two medics should not be established in the same soil for more than 4 consecutive years, due to the need for additional chemical treatments to protect them from pests and diseases.

- _ The recommended crop management practice for the region under study is to **rotate a cereal with an N-fixing broadleaf species**. The preference for the broadleaf to use in the rotation is: ‘Kelson’ medic > faba bean > grazing vetch > ‘Paraggio’ medic.

In summary, the authors compared 8 cover crop species in combination with two methods of cover crop chemical control for use in the coastal region vineyards in South Africa. The two oat species studied produced good continuous suppression of winter weeds, while both the two oats and the rye produced effective long-term suppression of summer weeds. However, despite the higher performance of the cereals, the authors recommend rotating these species with broadleaf, N-fixing species. All the species tested should ideally be re-seeded annually, as none of them were able to establish reliably on their own.

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