

## EFFECTS OF GRASSING DOWN ON FRUIT ROTTING AT HARVEST

### Summary

This orchard trial was set out using six cultivars of grass in the tree rows and two varieties of cider apples. The grass was established in early summer and the levels of fruit rotting at harvest were assessed. There was a considerable reduction in losses due to fruit rotting. This is likely to be of economic significance to all cider growers, there was no competition effect of the grasses on the cropping of the trees in the first year.

### The orchard

Vilberie and Brown Snout on MM106 were planted on a supply contract to Bulmers in 1974. A 3m wide herbicide strip had been maintained continually using simazine and aminotriazole applied annually in March and CMPP/2-4D in June, leaving a grass alleyway of 2m. *equisetum arvense* was the only problem weed which escaped herbicide control.

### Establishment of grass under the trees

The soil in the strips was scarified before sowing and raking the grass seed in at a rate of 40kg/ha [4g/m<sup>2</sup>] in May. A few large competitive annual and perennial weeds were pulled two weeks after sowing to avoid excessive competition and to achieve an even grass cover.

### Fruit harvesting and sampling

Fruit samples were collected from 3 x 1m<sup>2</sup> sites on each plot one day prior to harvesting the total crop manually in November.

### Results

The results are summarised in the following tables

Table 1: Fruit rotting on bare soil and grass due to phytophthora

Variety	Treatment	No rots		Visible rots	
		Fruit/m <sup>2</sup>	Wt fruit/m <sup>2</sup>	Fruit/m <sup>2</sup>	Wt fruit/m <sup>2</sup>
Brown Snout	No grass cover	139	6.11	33	1.16
	Grass 95% cover	183	8.24	8.5	0.30
Vilberie	No grass cover	137	9.13	45	3.03
	Grass 95% cover	204	12.40	22	1.76

Table 2: Percentage fruit losses due to rotting

Variety	Treatment	Percentage rots/2	% weight loss/m <sup>2</sup>
Brown Snout	No grass cover	19.18	15.95
	Grass 95% cover	4.43	3.51
Vilberie	No grass cover	24.72	24.91
	Grass 95% cover	9.82	12.42

Table 3: A comparison of crop/hectare between grass cover and no grass cover showing the resulting loss due to rotting in the herbicide strip, and the financial loss [Calculated at fruit price of £86/tonne]

Variety	Treatment	Crop tonnes/ha	Loss tonnes/ha	Loss £/ha
Brown Snout	No grass cover	37.49	5.97	£513.42
	Grass 95% cover	54.10	1.89	£162.54
Vilberie	No grass cover	57.85	14.41	£1239.26
	Grass 95% cover	73.95	9.18	£789.48

Table 4: Commercial cropping records from 3m wide herbicide strips with no grass cover compared with similar strips sown with six varieties of grass[20 tree replicates]

Variety	No grass Crop t/ha	Grass		Crop difference	
		Grass cv.	Crop t/ha	Increase t/ha	% increase
Vilberie	58.93	Bartok	81.84	22.92	28
Brown Snout	33.92	Baron	56.81	22.89	40
Vilberie	53.92	Barcredo	66.96	13.04	19
Brown Snout	42.85	Baruba	52.75	9.90	19
Vilberie	60.71	Barcrown	73.05	12.34	17
Brown Snout	35.71	Dutch wood meadow	52.75	17.04	32

Table 5: Commercial cropping comparison of varieties [tonnes/ha]

Variety	No grass	Grass
Brown Snout	37.49	54.10
Vilberie	57.85	73.95

## Discussion

### Fruit rotting

The rotting levels shown in the tables were assessed by counting any fruit showing a rot larger than 5cm circumference. There was an obvious difference in the numbers of rotted fruit when counting on bare soil and the grass. It was also noticeable that fruit which had fallen on a patch of soil in a grassed area had nearly always started to rot. Fruit which had fallen prematurely and which showed signs of shrivel was also nearly always starting to rot. It is known from desert fruit research [Johnson. EMR] that *Phytophthora* fruit rot increases in wet conditions at harvest. The results of this trial indicate that a minimal time between shaking and harvesting minimises this risk. The experimental design of the trial does not allow for comparison of each variety of apple falling on each variety of grass, but it was noticeable that there was less rotted fruit where there was a thick carpet of grass, regardless of its variety.

### Cropping levels

The figures in tables 4 and 5 show a substantial increase in sound fruit harvested where the ground had been grassing-down. This was most unexpected since competition from grass has been shown by many researchers [Atkinson & White. EMR] to reduce yield. There is a possibility that these results could be due to surface cultivation prior to seeding, as the week following seeding was unusually wet. The rainwater may have been immediately available to the trees in the newly grassed area. The herbicide strip area had in contrast, a very hard capped surface that increased run-off away from the trees and into the alleyway.

### Financial implications

The figures in Table 3 show a very substantial economic loss due to rotting which is clearly greatly reduced by grassing-down under the trees. The real loss is not as severe in practice since many of the rotten fruits are picked up by machine harvesting, resulting in an inferior sample of fruit for processing. Only those apples that are very soft with rot are squashed by the machine and not picked up. The presence of rotted fruit must reduce the quality of the juice. If quality standards are raised in the future by the cider manufacturers, there will be a strong incentive for growers to minimise the amount of rotted fruit that gets picked up. Table 3 also highlights the importance of keeping the shaking and picking up operations as close as possible, and of sending fruit for processing immediately it has been harvested.

### Environmental implications

There is a substantial environmental gain from grassing-down, since herbicide use and potential residues can be reduced. There is likely to be a gradual increase in soil organic matter under the grass. Organic matter levels normally fall over time in bare soil [Atkinson. EMR]. The increase in organic matter over a number of years will increase soil fertility to the benefit of the trees and future land use.

### Conclusion

This experiment has shown that grassing-down an established cider orchard is possible in one year, with a substantial decrease in fruit rotting prior to harvest. There was no competitive effect of the grass with the trees in the first year.