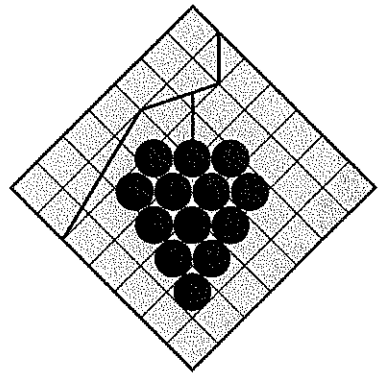


The use of hydrogen cyanamide to improve budburst in cane pruned Riesling, Chardonnay and Cabernet Sauvignon vines grown in the Margaret River region of Western Australia

FINAL REPORT to
GRAPE AND WINE RESEARCH & DEVELOPMENT CORPORATION

Project Number: **DAW 1V (1GW)**

Principal Investigator: **Mr P B Gherardi**

Research Organisation: **WA Department of Agriculture**

Date: **1991**

GRAPE AND WINE RESEARCH
AND DEVELOPMENT CORPORATION

FINAL REPORT DAW IV

THE USE OF HYDROGEN CYANAMIDE TO IMPROVE BUDBURST IN CANE PRUNED RIESLING, CHARDONNAY AND CABERNET SAUVIGNON VINES GROWN IN THE MARGARET RIVER REGION OF W.A.

BY

MR P.B. GHERARDI

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PROJECT TITLE

The use of hydrogen cyanamide to improve budburst in cane pruned Riesling, Chardonnay and Cabernet Sauvignon vines grown in the Margaret River region of Western Australia.

PROJECT NUMBER

Daw IV

ORGANISATION

Department of Agriculture.

LOCATION

Western Australia.

SUPERVISOR

Mr P B Gherardi

TIME SPAN

June 1988 - March 1991

OBJECTIVE

To study the effects of hydrogen cyanamide on improving budburst in cane pruned Riesling, Chardonnay and Cabernet Sauvignon vines grown in the Margaret River region of Western Australia.

AIMS

The aim of this project was to study the affect of hydrogen cyanamide on improving budburst, thereby reducing apical dominance in the grape varieties Riesling, Chardonnay and Cabernet Sauvignon in the Margaret River region. With the anticipated improvement in budburst, it is expected that overall yields would increase significantly.

INDUSTRY SIGNIFICANCE

The Margaret River viticultural region lies within close proximity to, and is significantly influenced by, the Indian Ocean. The effect of the ocean is to modify winter temperatures to such an extent that vines growing in this environment experience little winter dormancy.

Often, winter temperatures rarely fall below 10°C, therefore varieties such as Chardonnay and Riesling may experience budburst as early as the end of June or beginning of July. This is usually associated with apical dominance in cane pruned vines.

Of the 900 hectares of vines in the Margaret River region, almost 650 hectares would be cane pruned. The varieties Cabernet Sauvignon (230 ha), Riesling (120 ha) and Chardonnay (120 ha) often exhibit erratic vigour and suffer from extremely poor budburst and erratic early growth.

Previous work in the Margaret River region (Hamilton and Gherardi, unpublished data) over five successive seasons has shown that the average percentage budburst experienced in these varieties when cane pruned is between 50 - 60%. This contributes to low fruit yields of between 2.5 - 6 tonnes/ha. Improving the budburst in these varieties should increase the potential for improving yield.

It is suggested that the use of the plant growth regulator hydrogen cyanamide (Dormex ®) after pruning will improve budburst and therefore lead to an increase in yield.

EXPERIMENTAL DESIGN

- **Treatments**

  T_1 Control - no treatment spray.
  T_2 1% hydrogen cyanamide spray.
  T_3 2% hydrogen cyanamide spray.
  T_4 4% hydrogen cyanamide spray.

- **Number of pruning times : 1.**

- **Number of varieties : 3**

  Riesling
  Chardonnay
  Cabernet Sauvignon

- **Replications : 4**

- **Number of vines per treatment : 4 in a panel**

- **Design Layout:**

Rep 1	B	T_3	B	T_4	B	T_1	B	T_2	B
Rep 2	B	T_2	B	T_1	B	T_3	B	T_4	B
Rep 3	B	T_4	B	T_3	B	T_1	B	T_2	B
Rep 4	B	T_1	B	T_3	B	T_4	B	T_2	B

B = Buffer panel of 4 vines
Tx = Treatment applied to 4 vines

Note: The same treatment layout was used for each variety.

APPLICATION OF TREATMENTS

To ensure that the anticipated budburst response of treatment vines co-incided closely with that of the control vines and the majority of the vines in the block, pruning time was determined after discussion with the vineyard owner.

Vines were pruned and sprayed on the same day. The pruning and spraying times are shown in Table 1.

Table 1.

Pruning and Spraying Dates			
Year	**Chardonnay**	**Riesling**	**Cabernet Sauvignon**
1988/89 (Yr 1)	19 July	26 July	18 August
1989/90 (Yr 2)	27 July	4 August	15 August
1990/91 (Yr 3)	23 July	1 August	18 August

Budburst response to hydrogen cyanamide is expected 28-30 days after application . The data recorded was:

(a) % budburst every 2-5 days until the response ceased.
(b) fruit weights at harvest.

Hydrogen cyanamide was applied using a knapsack. All treatments were applied to runoff. Only the canes of the previous season's growth were treated.

The treatment vines used were 12-14 yrs old and trained on a narrow 'T' trellis. They were pruned to 4 equal length canes, in response to vine vigour.

RESULTS

The data in Table 2 shows that there appears to be considerable year by year variation. In year 1 and to a lesser extent, year 3, the control vines were slower to burst than the treated vines (see Appendix for graphical representation of this data).

A Chardonnay

Table 2

Number of days from treatment to 50% budburst (% budburst at last recording)			
Treatment	**Yr 1**	**Yr 2**	**Yr 3**
Control	60 (60%)	42 (70%)	47 (66%)
1% Cyanamide	36 (70%)	41 (76%)	40 (83%)
2% Cyanamide	35 (78%)	38 (88%)	41 (84%)
4% Cyanamide	37 (71%)	39 (84%)	40 (78%)

In all years the 2% cyanamide treatment appeared to give the greatest response, although this was not statistically significant.

Budburst was increased with all treatments compared to the controls. It was more even and earlier.

Table 3

Total fruit weight (kg) harvested from each treatment (16 vines)			
Treatment	**Yr 1**	**Yr 2**	**Yr 3**
Controls	47.8	87.7	94.3
1% Cyanamide	45.4	87.4	116.9
2% Cyanamide	43.8	82.4	119.4
4% Cyanamide	34.3	85.3	107.1

The yield data in Table 3 reflected the budburst response only in Year 3. There was a threefold increase in yield from year 1 to year 3. This mirrors the performance of the vineyard as a whole. There was a problem with general nutrition of the vines and bud fruitfulness. This improved over the duration of the trial.

B Cabernet Sauvignon

Table 4

Number of days from treatment to 50% budburst (% budburst at last recording)			
Treatment	**Yr 1**	**Yr 2**	**Yr 3**
Control	58 (53%)	45 (59%)	57 (62%)
1% Cyanamide	48 (61%)	38 (69%)	42 (75%)
2% Cyanamide	42 (65%)	36 (73%)	41 (78%)
4% Cyanamide	38 (72%)	35 (76%)	44 (70%)

In all three years hydrogen cyanamide increased budburst and reduced the time from application to 50% budburst (see Table 4). In Years 1 and 2 the 4% cyanamide treatment gave the highest percentage of budburst, whilst in Year 3 there was no significant difference between treatments (see Appendix for graphical representation of this data).

Table 5

Total fruit weight (kg) harvested from each treatment (16 vines)			
Treatment	**Yr 1**	**Yr 2**	**Yr 3**
Control	73.4	86.9	90.5
1% Cyanamide	57.0	85.0	128.4
2% Cyanamide	70.1	83.2	146.0
4% Cyanamide	58.3	96.4	114.5

In Year 2 only the 4% cyanamide treatment significantly increased yield (Table 5) while in Year 3 all treatments improved yield significantly.

C Riesling

Table 6

Number of days from treatment to 50% budburst (% budburst at last recording)			
Treatment	**Yr 1**	**Yr 2**	**Yr 3**
Control	66 (52%)	55 (57%)	62 (50%)
1% Cyanamide	40 (61%)	53 (56%)	47 (63%)
2% Cyanamide	36 (67%)	47 (60%)	48 (61%)
4% Cyanamide	39 (61%)	47 (54%)	48 (63%)

The data in Table 6 shows that Riesling responded to hydrogen cyanamide application in Years 1 and 3. Even so, budburst percentages were still very low in all years. There appeared to be little effect on the vines of the different concentrations of cyanamide used.

Table 7

Total fruit weight (kg) harvested from treatment vines (16 vines)			
Treatment	**Yr 1**	**Yr 2**	**Yr 3**
Control			84.0
1% Cyanamide			89.7
2% Cyanamide			80.4
4% Cyanamide			74.6

* No data was available for Yr 1 and Yr 2.

Only yield data from Yr 3 was obtained. The response was not significant, although for the highest level of cyanamide yield appears to have been depressed as shown in Table 7.

DISCUSSION

All three varieties responded to hydrogen cyanamide, which was expressed as an earlier release of buds from dormancy and a greater percentage of total buds that burst. This agrees with the findings of other investigators.

However, the varieties' response varied depending on the treatment applied.

Chardonnay gave the greatest response to hydrogen cyanamide, while Riesling the least. There was no difference in response between the concentrations of hydrogen cyanamide used on Riesling while for Chardonnay the 2% hydrogen cyanamide treatment gave the best result and for Cabernet Sauvignon the 4% treatment was best.

In an environment like Margaret River with relatively mild winters and lack of frosts, hydrogen cyanamide broke dormancy more evenly and reduced the problem of apical dominance. This resulted in easier management of early control sprays for diseases and a greater selection of canes for pruning the following season.

Yield data was more erratic. In Year 2 and particularly in Year 3 the response to cyanamide lead to an increased yield.

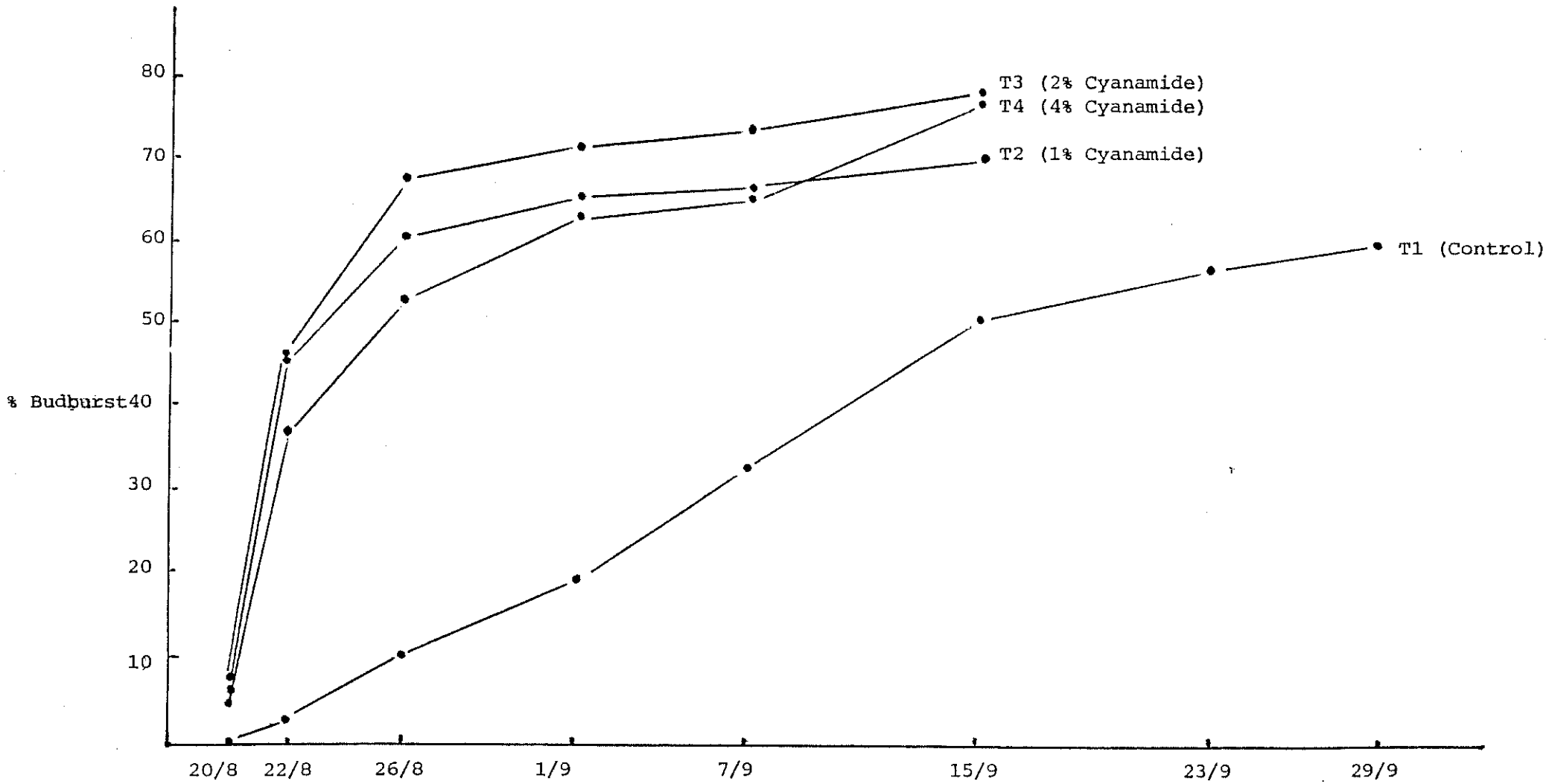
The nutritional state of the vineyard at the beginning of the project was very low. Much remedial work with lime and various fertilizer applications occurred over the three years. This improved yields from year 1 to year 3 for both Chardonnay and Cabernet Sauvignon vines. Riesling appeared less sensitive to cyanamide application. One factor leading to the increase in yield was an improvement in bud fruitfulness.

The project would have benefited from more data being collected, including a number of bunches, bunch weights and berry weights.

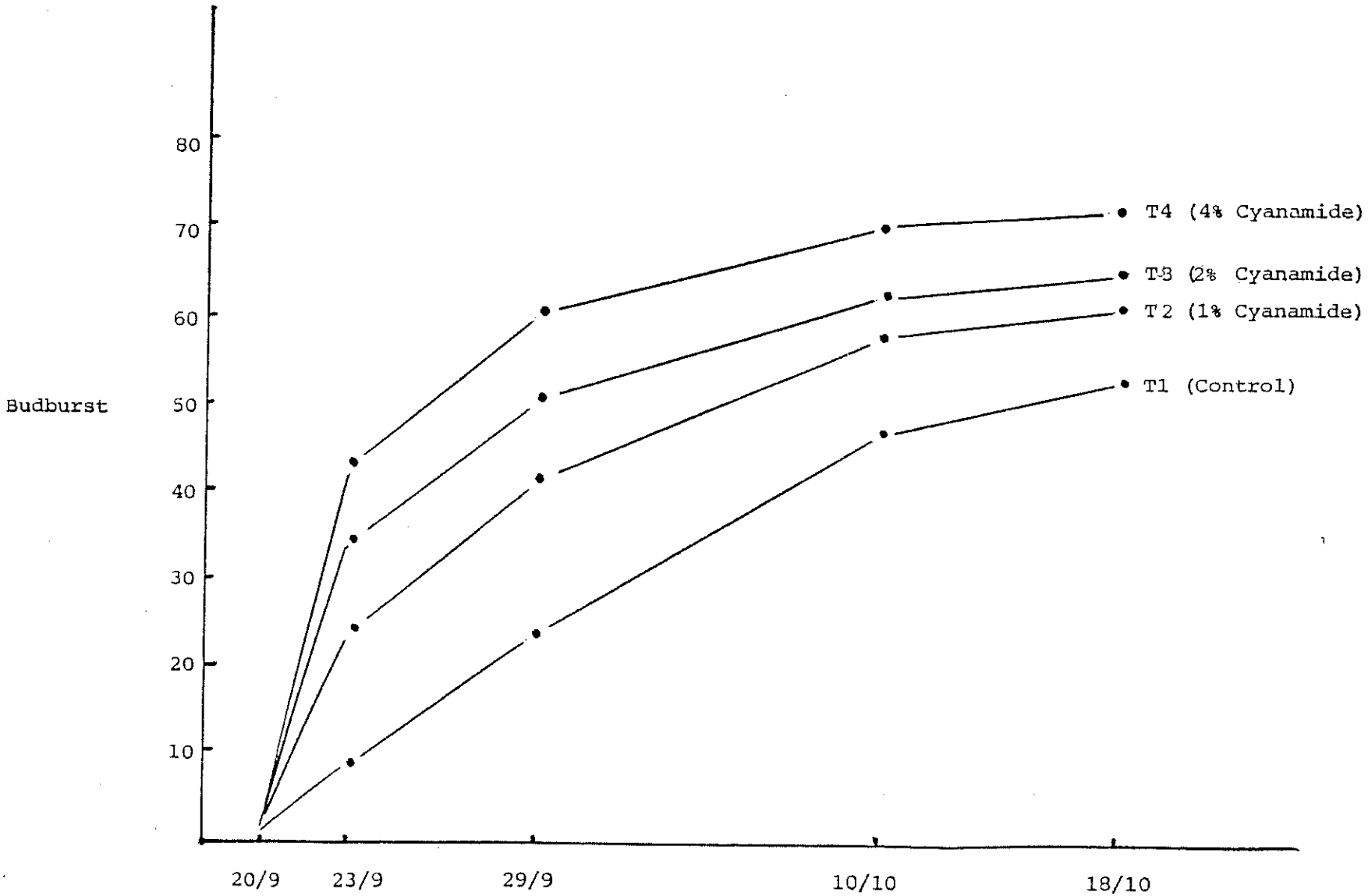
CONCLUSIONS

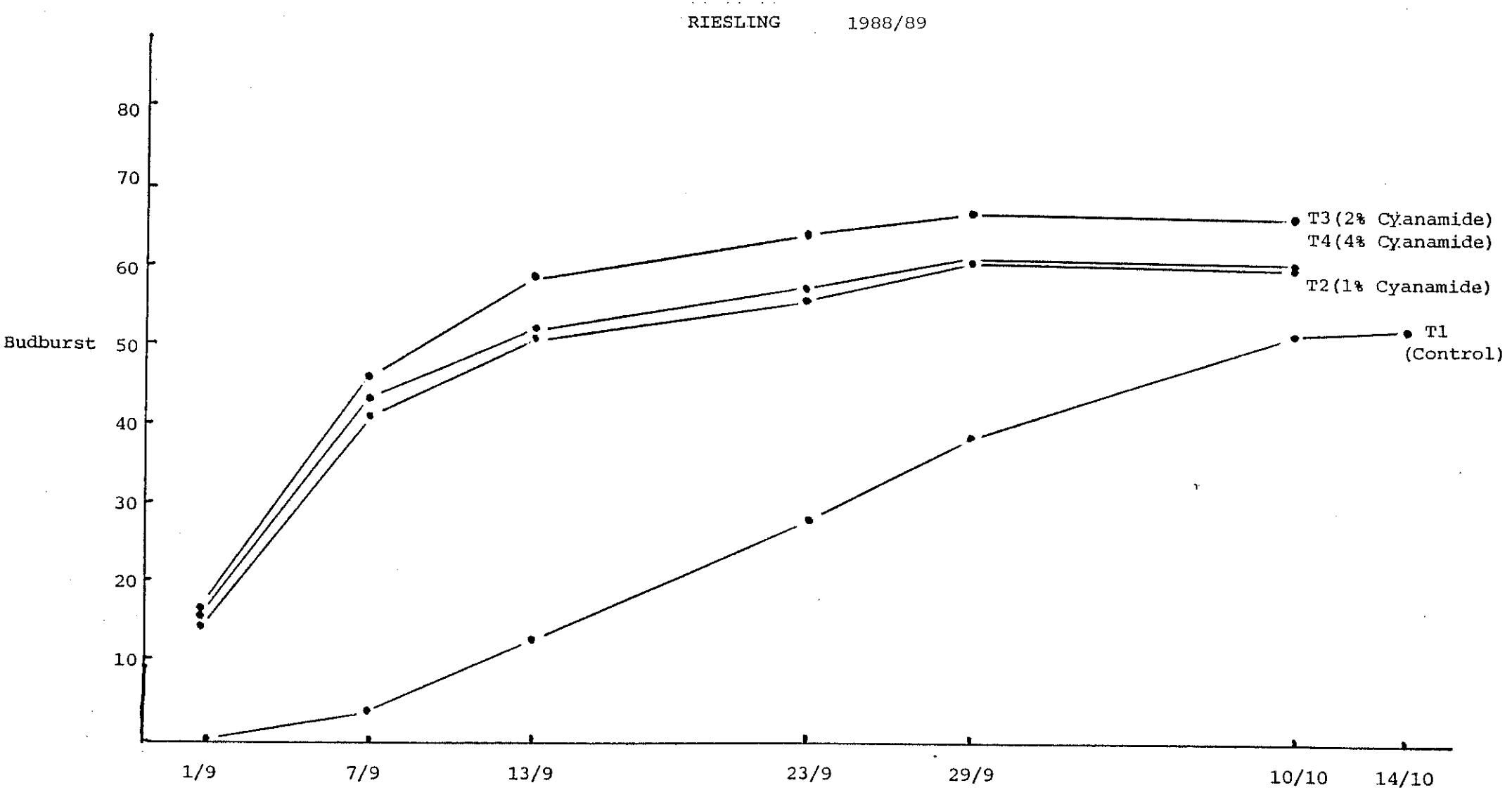
- Hydrogen cyanamide improved budburst.
- The response was greater in some varieties than others.
- Hydrogen cyanamide is now being used in several vineyards in the Margaret River region.
- The yield response was variable.
- Further collection of data on yield parameters would have shown why the increase in budburst did not translate into yield increases.

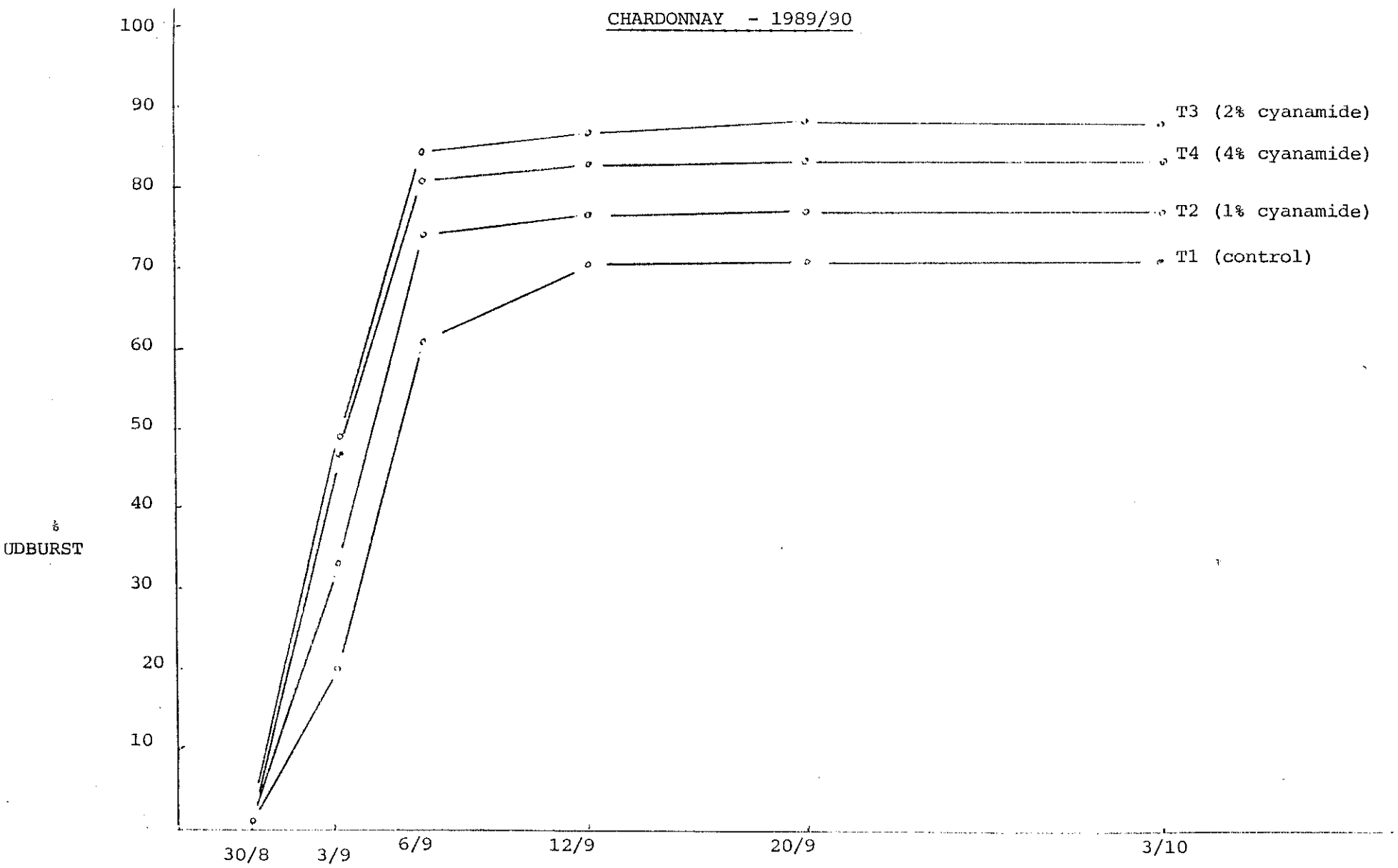
CHARDONNAY 1988/89



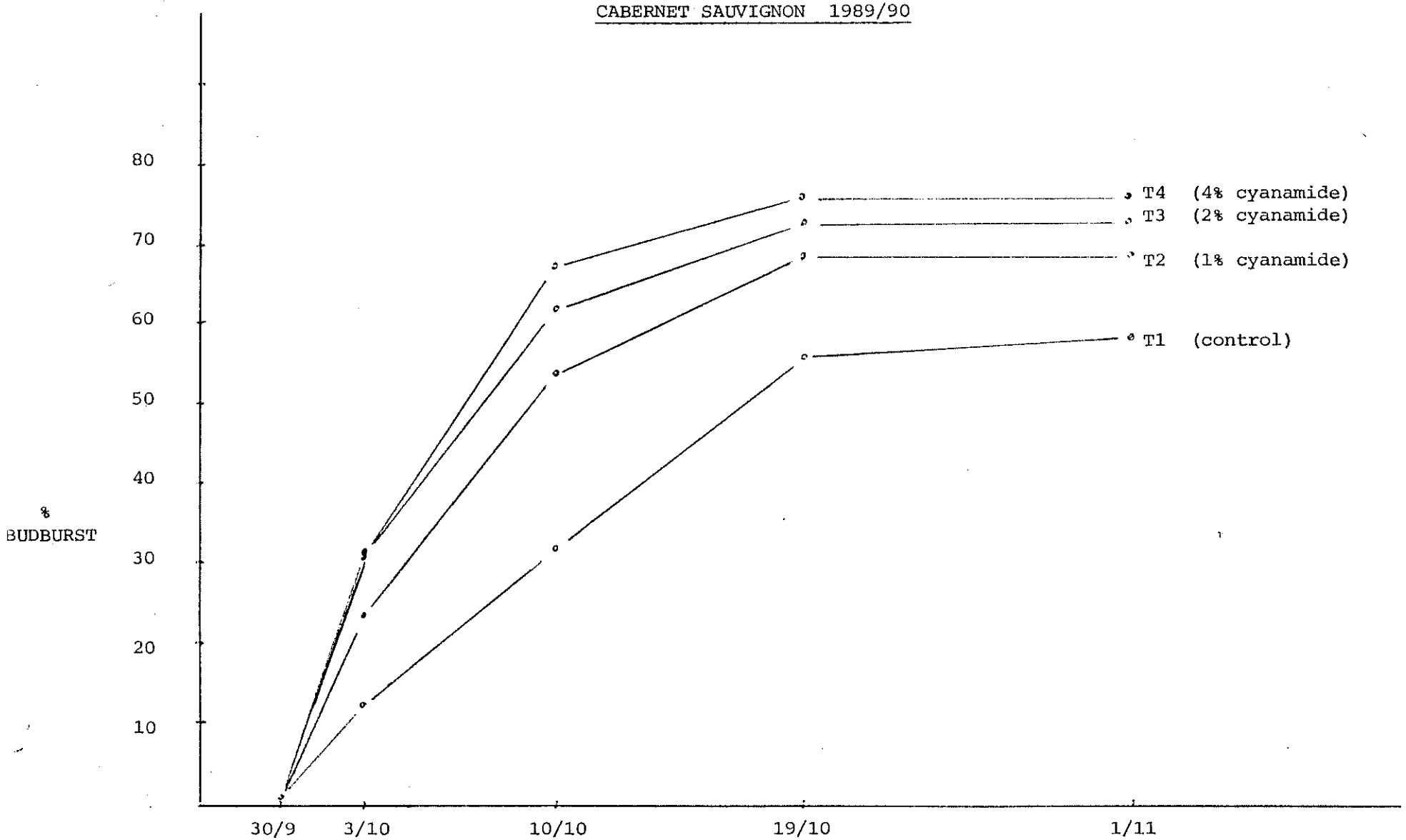
CABERNET SAUVIGNON 1988/89



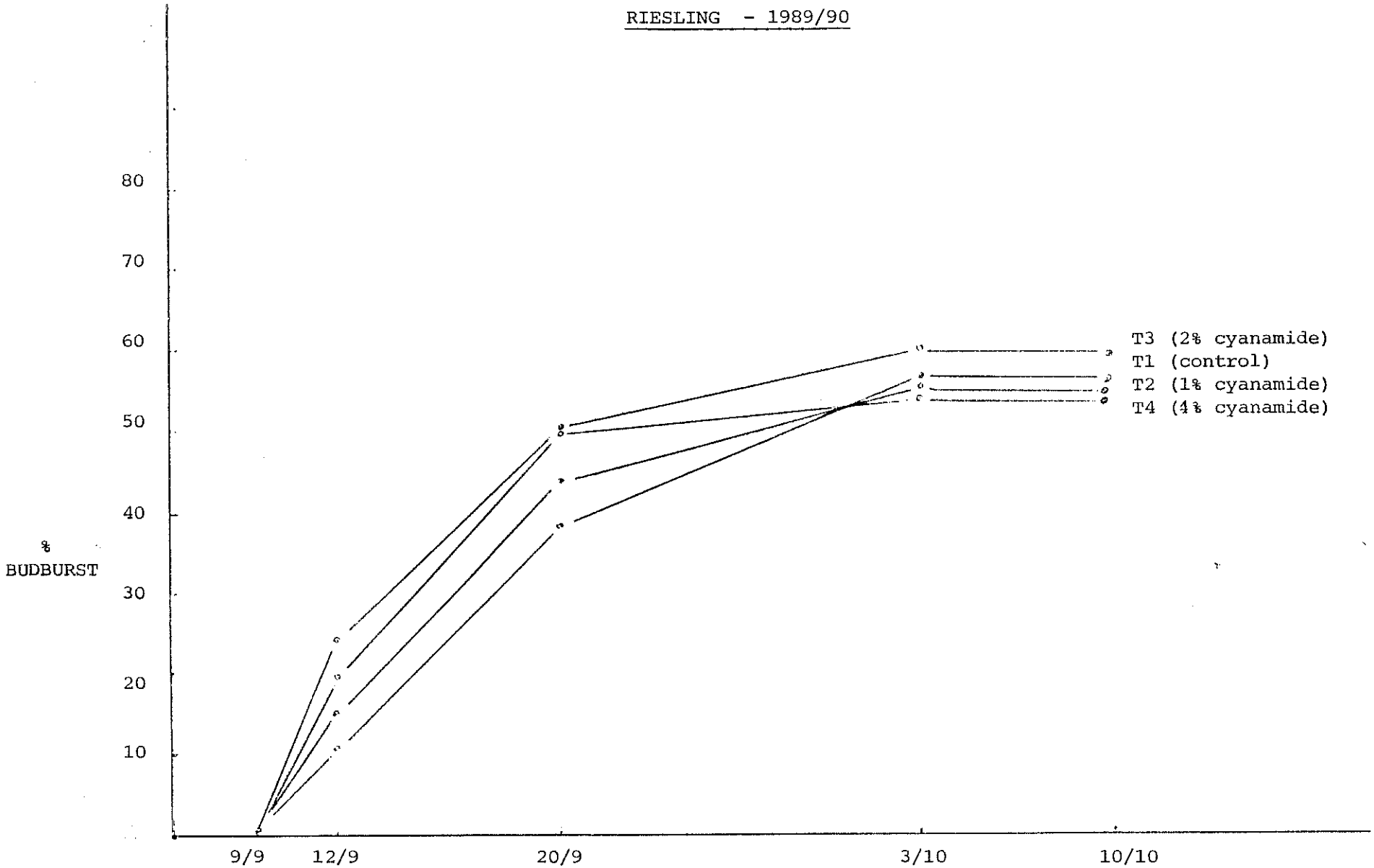

RIESLING 1988/89
Budburst
80
70
60
50
40
30
20
10
1/9
7/9
13/9
23/9
29/9
10/10
14/10
T3(2% Cyanamide)
T4(4% Cyanamide)
T2(1% Cyanamide)
T1
(Control)

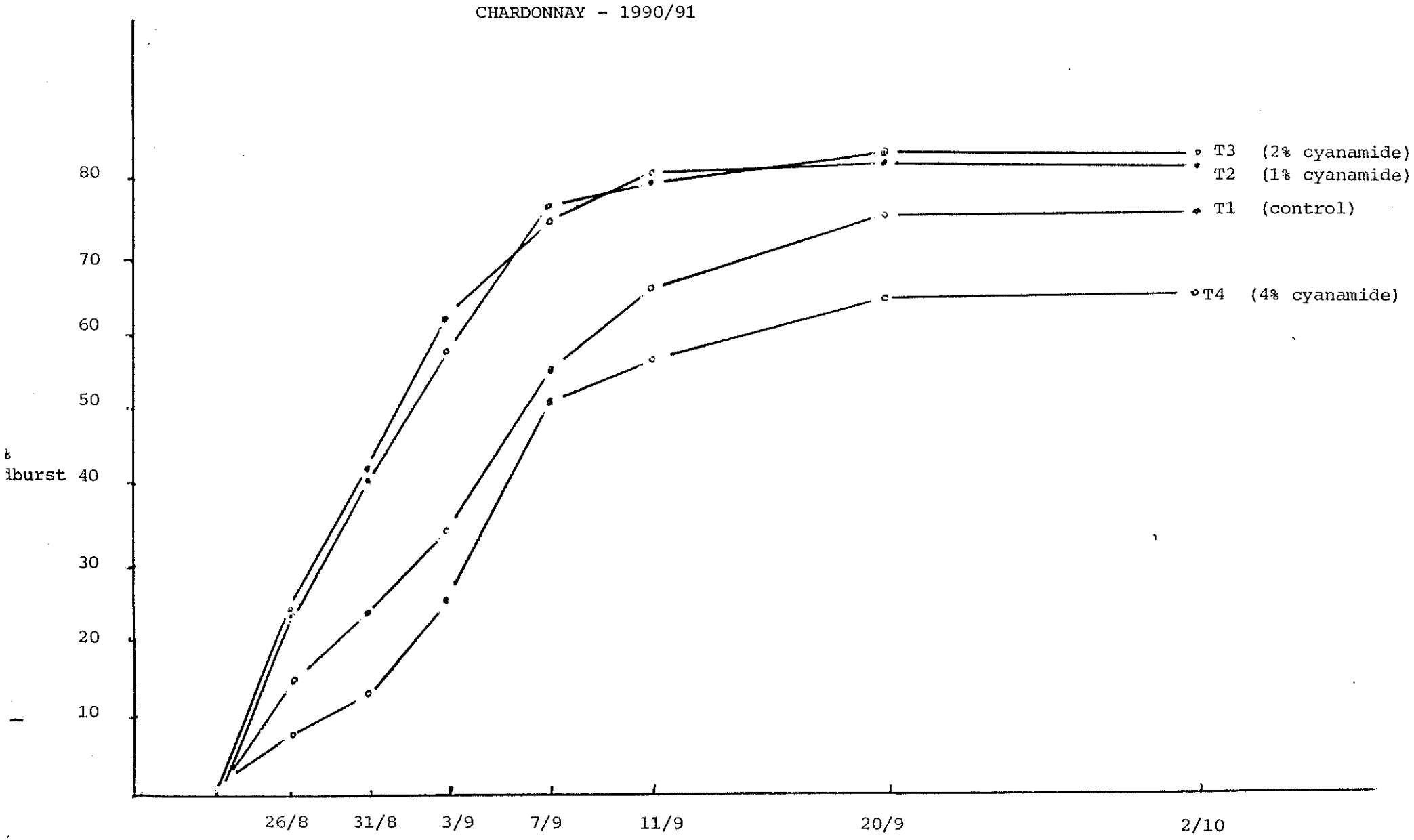

CHARDONNAY - 1989/90
100
90
80
70
60
50
40
30
20
10
% UDBURST
30/8
3/9
6/9
12/9
20/9
3/10
T3 (2% cyanamide)
T4 (4% cyanamide)
T2 (1% cyanamide)
T1 (control)

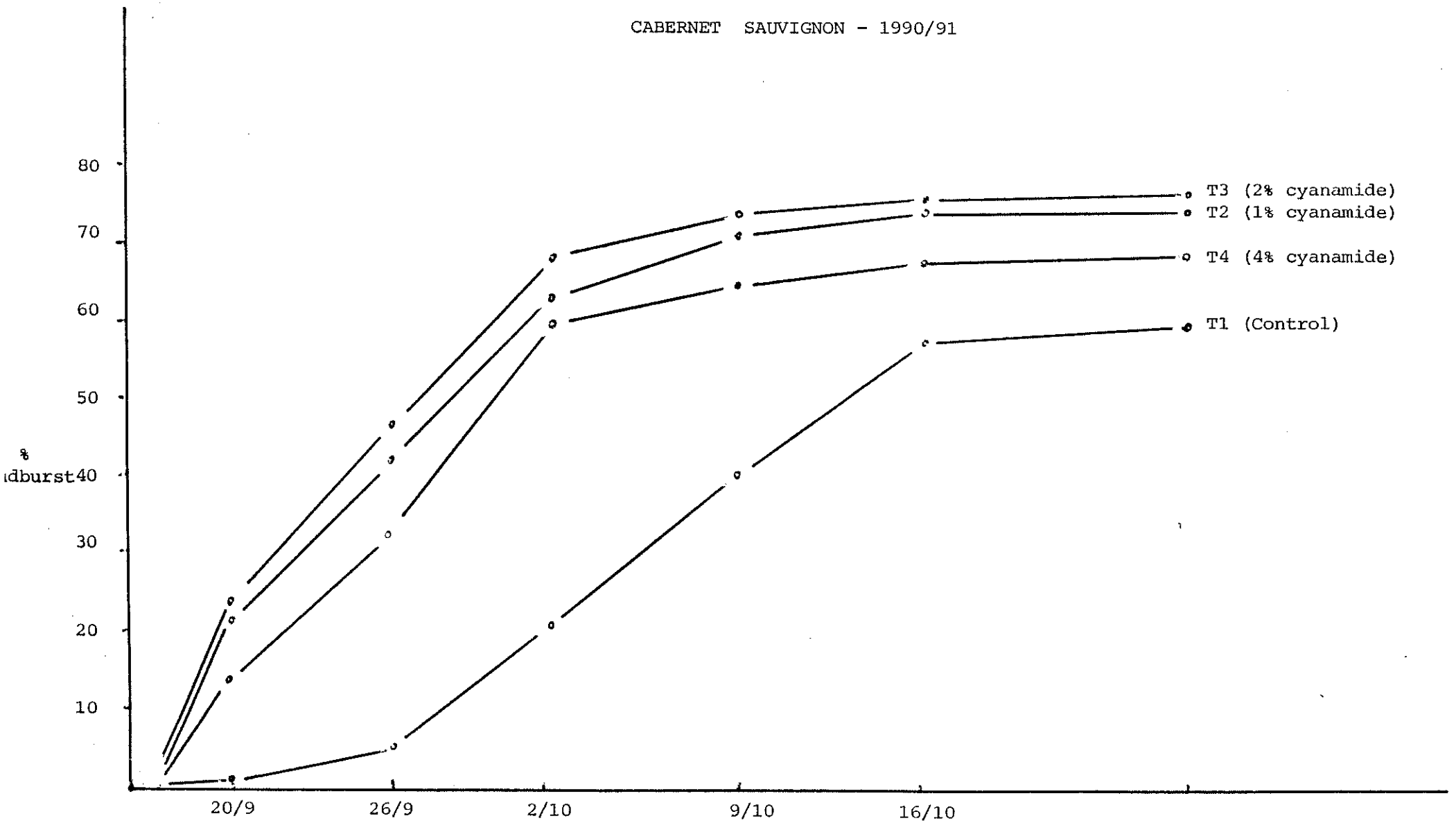
CABERNET SAUVIGNON 1989/90



RIESLING - 1989/90




CHARDONNAY - 1990/91
80
70
60
50
40
30
20
10
iburst
T3 (2% cyanamide)
T2 (1% cyanamide)
T1 (control)
T4 (4% cyanamide)
26/8
31/8
3/9
7/9
11/9
20/9
2/10


CABERNET SAUVIGNON - 1990/91
80
70
60
50
40
30
20
10
%
idburst
20/9
26/9
2/10
9/10
16/10
T3 (2% cyanamide)
T2 (1% cyanamide)
T4 (4% cyanamide)
T1 (Control)

RIESLING - 1990/91

