7. CROP DISEASE TRIALS

7.1 WHEAT DISEASE AND FUNGICIDE TRIAL

Location: "South Roxby" Gnarwarre

Researchers: Colin Hacking, Wes Arnott (SFS Ltd)
Peter O'Loughlin (Agvise Services)
Dr Jim Davidson
Dr Susan Kleven (CSIRO Canberra)

Background:
Fungal diseases along with BYDV impact the yield of susceptible wheat cultivars in the "high rainfall, cool climate" zone of southern Australia. The economic loss caused by these diseases is not clear, with little evaluation work having been done in this environment. Most control data comes from much drier environments where yield potentials and possible economic losses caused by these diseases is much lower.

Aims:
- To assess the impact of BYDV and fungal leaf diseases on the yield of wheat
- To assess the effect of insecticides and fungicides on these diseases
- To determine the cost effectiveness of using fungicides and insecticides to control these diseases.

Trial Design:
A split plot design was used with 3 replications. A total of 9 spray treatments were applied across 4 different wheat varieties.

Varieties included:
Kellalac (susceptible to BYDV and leaf rust)
LH64C (resistant to BYDV and resistant to leaf rust)
LH52IR1 (resistant to BYDV and susceptible to leaf rust)
E30.82 (susceptible to BYDV and resistant to leaf rust)

Treatments included:
Tr1: Control (no fungicide or insecticide applied)
Tr2: Amistar (240 g/ha) + Impact (250 ml/ha) applied at flag leaf (GS39) stage
Tr3: Impact (250 ml/ha) applied at flag leaf (GS39) stage
Tr4: Amistar (240 g/ha) + Impact (250 ml/ha) applied at GS32 and GS39
Tr5: Impact (250 ml/ha) applied at GS32 and GS39
Tr6: + insecticide (Dominex 125ml/ha) at 1 leaf stage
Tr7: Amistar (240 g/ha) applied at GS32 and at GS39
Tr8: Amistar (240 g/ha) applied at GS39
Tr9: Amistar (240 g/ha) + Impact applied at GS32 and GS39 + Dominex (125 ml/ha) at 1 leaf stage

Seed Treatment: Raxil (100ml/100kg seed)

Fertiliser:
- 100 kg/ha MAP at planting
- 75 kg/ha Urea in crop at late tillering

Herbicides & insecticides:
- 1.5 L/Ha Roundup Max + Goal CT + 100 ml/ha Dimethoate pre plant (4/5/01)
- 700 ml/haTigrex applied on 27/6/01
- 1.5 L/Ha Tristar Advance applied on 13/7/01

Fungicide applications:
- Kellalac & E30.82 sprayed at GS32 on 23/8/01 with Impact and Amistar where required
- LH64C & LH52IR1 sprayed at GS32 on 28/8/01 with Impact and Amistar where required
- Kellalac, E30.82 and LH64C sprayed at GS39 on 2/10/01 with Impact & Amistar where required
- LH52IR1 sprayed at GS39 on 9/10/01 with Impact & Amistar where required.

Photo taken 29th Nov 2001 showing general trial layout.

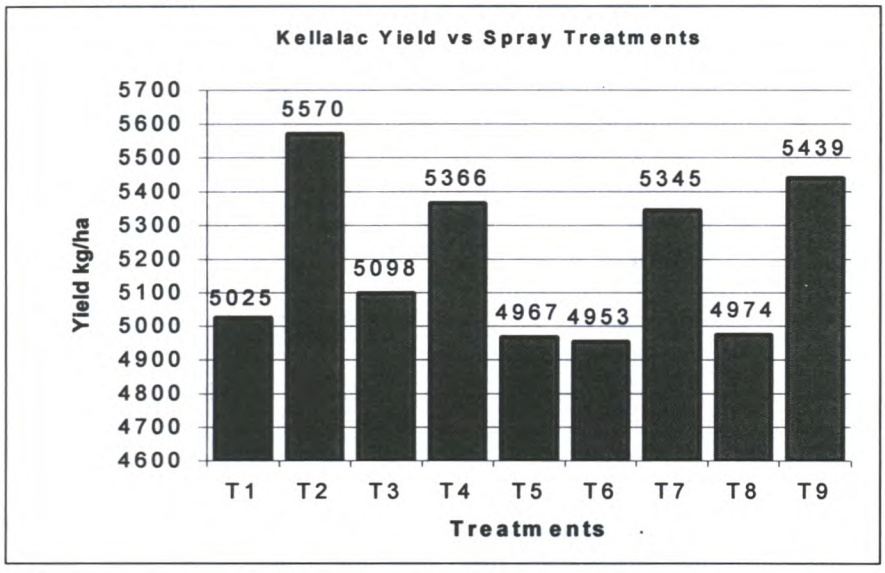
Photo Above: Rust trial being sprayed on 28th August 2001

Results:

A) Variety Comparison
The average yield and grain quality for varieties across all spray treatments was:

Variety	Yield kg/ha	Protein %	Test Wt kg/hl
LH 52IR1	6,848	10.1	75.5
LH64C	6,708	10.2	76.6
E30.82	6,028	11.2	74.2
Kellalac	5,193	11.0	77.1
LSD 5%	253		

B) Spray Treatments
There was a significant response to the spray treatments in Kellalac (LSD 534 kg/ha). The results are given in the following graph:



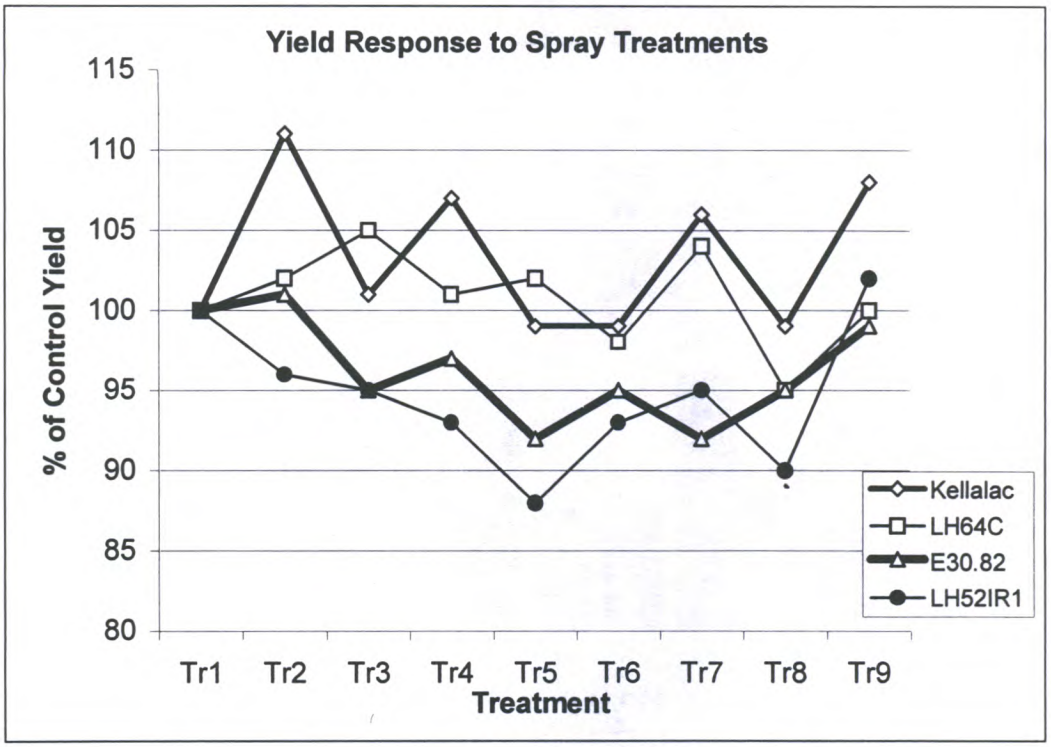
Treatments 2, 3, 4, 7 and 9 are not significantly different in yield.

Treatment 2 is significantly superior to treatments 1, 5, 6 and 8

C) Spray Treatment Yield Effects on All Varieties

The effect of the spray treatments on each of the varieties is given in the following graph. This shows the yield relative to the control for each of the treatments expressed as a percentage of the control. There was no significant difference between spray treatments for all varieties other than Kellalac except that Treatments 5 and 8 were significantly lower yielding for variety LH52IR1.

It can be clearly seen that there appeared to be some benefit to Kellalac and LH64C under some fungicidal spraying regimes, however E30.82 and LH52IR1 responded adversely to most of the spray treatments.

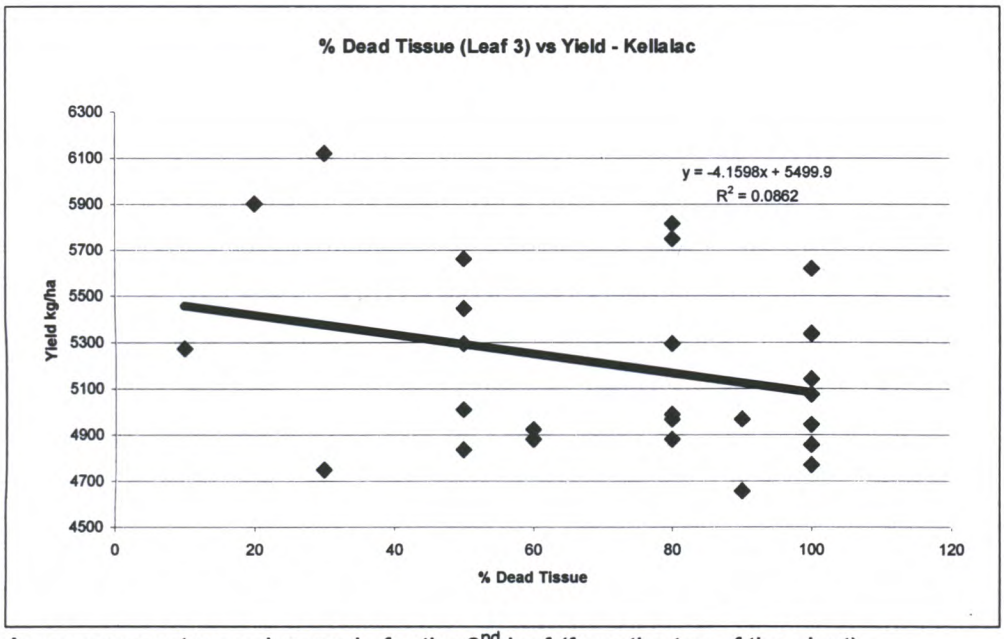


D) Leaf Disease Assessment

Observations were conducted on 10th November 2001 to assess the level of disease infection in each of the treatments. The following table represents the percentage of dead and chlorotic tissue caused by a combination of disease and natural senescence for the **3rd leaf** (from the top of the plant).

	Tr1	Tr2	Tr3	Tr4	Tr5	Tr6	Tr7	Tr8	Tr9	Average
Kellalac	93	70	90	47	80	87	40	97	37	71
LH64C	15	12	13	2	15	15	3	9	5	10
E30.82	23	12	43	5	28	22	7	23	5	19
LH52IR1	37	37	7	25	23	32	15	33	25	26
Average	**42**	**33**	**38**	**20**	**37**	**39**	**16**	**41**	**18**	**31**

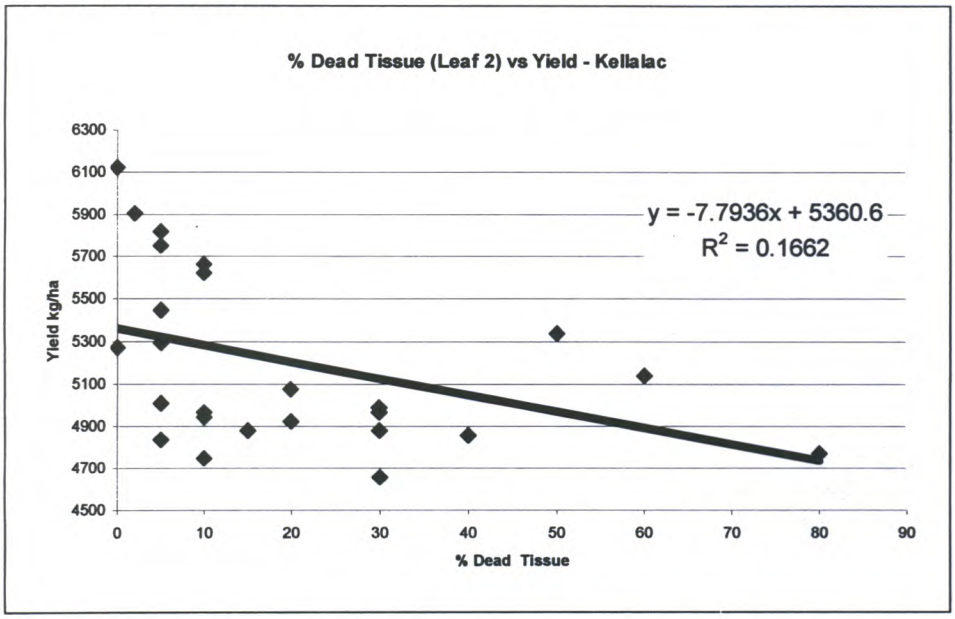
There would appear to be a very good negative correlation between the percentage of dead and chlorotic leaf (3rd leaf) and yield for Kellalac. The higher the percentage of dead and chlorotic leaf, the lower the yield. The data would not appear to be conclusive for the other 3 varieties. Tr7, Tr9 and Tr4 were giving the cleanest leaf across all varieties.



An assessment was also made for the 2nd leaf (from the top of the plant)
The graph and table shows this data:

	Tr1	Tr2	Tr3	Tr4	Tr5	Tr6	Tr7	Tr8	Tr9	Average
Kellalac	47	7	37	3	35	27	4	17	5	20
LH64C	0	0	3	0	0	2	0	0	0	1
E30.82	7	2	0	0	0	0	0	0	0	1
LH52IR1	5	0	2	0	0	2	0	0	0	1
Average	**15**	**2**	**10**	**1**	**9**	**8**	**1**	**4**	**1**	**6**

Photo taken 29th Nov 2001 showing comparison of leaves in the Rust Trial. Kellalac, the bottom leaf showing signs of disease, with LH64C (top leaf) being very clear.

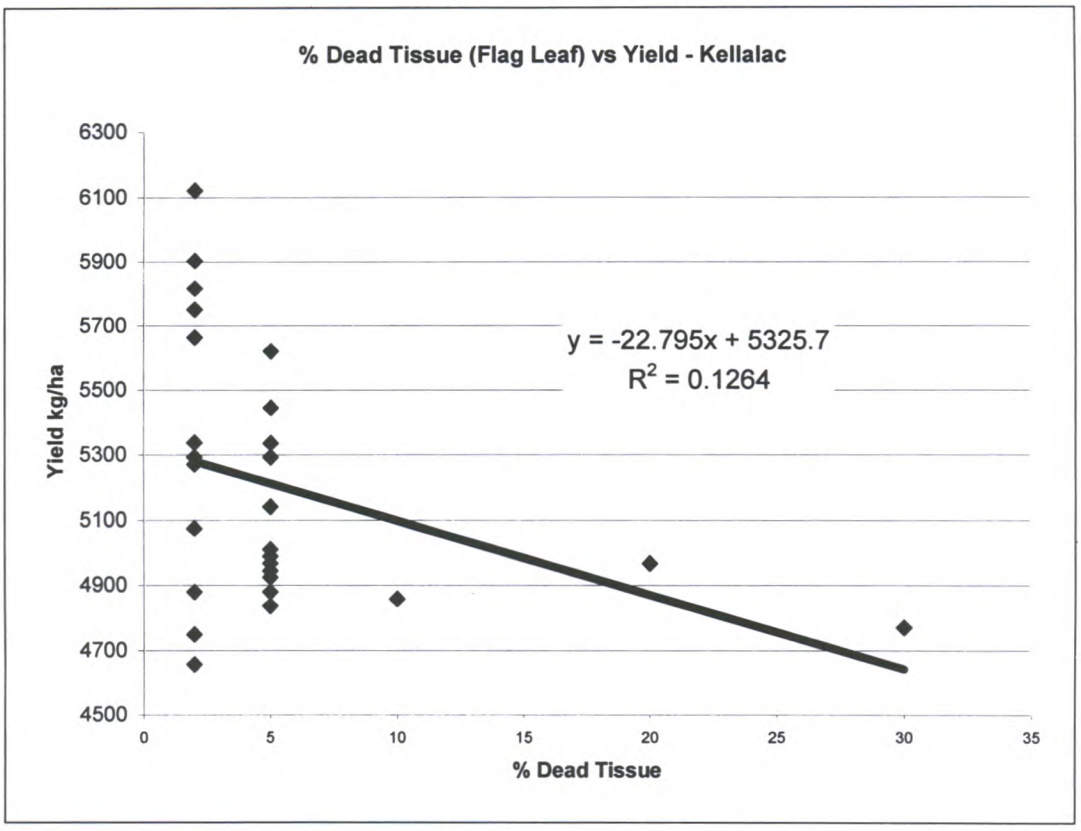


There appears to be a reasonably strong negative correlation between the percentage of dead and chlorotic leaf (2nd leaf) and yield for Kellalac. The treatments Tr9, Tr7, Tr4 and Tr2 showing the lowest levels of dead leaf in Kellalac were also the highest yielding treatments for this variety. There appears to be no real correlation between the percentage of dead and chlorotic leaf (2nd leaf) and the yield for the other varieties.

An assessment was also made for the 1st leaf (flag leaf). The following table shows this data:

	Tr1	Tr2	Tr3	Tr4	Tr5	Tr6	Tr7	Tr8	Tr9	Average
Kellalac	17	3	5	3	4	6	3	4	3	5
LH64C	0	0	0	0	0	0	0	0	0	0
E30.82	9	6	7	6	5	4	5	8	6	6
LH52IR1	4	3	5	3	5	7	4	6	2	4
Average	**8**	**3**	**4**	**3**	**4**	**4**	**3**	**5**	**3**	**4**

There was reasonably low levels of dead and chlorotic leaf material on the flag leaf of all varieties, although the control treatment (Tr1) for Kellalac was quite a bit higher than for the other treatments.



Conclusions:

The yield of Kellalac can be enhanced by the use of fungicides where there is fungal leaf disease present. A combination of Amistar and Impact seems to be giving the best yield results for Kellalac.

The yield of LH64C, LH52IR1 and E30.82 were not affected by the use of fungicides.

The amount of dead and chlorotic leaf material caused by disease on the top three leaves during early seed would appear to impact negatively on yield. The use of fungicides to keep these leaves green should have a positive effect on yield.

The use of an insecticide early (1 leaf stage) was ineffective in controlling BYDV because of low aphid numbers. Later infection of BYDV appeared to impact on the yield of the susceptible varieties.

Acknowledgements:

This trial was funded by the Grains Research and Development Corporation as the Project SFS4 ("Agronomy Research For Sustainable Farming Systems in the High Rainfall Zone").