UAN compatibility with herbicides and fungicides

Summary

Liquid nitrogen fertiliser as UAN is compatible with a range of commonly used herbicides and fungicides. This will enable a farmer to mix herbicides with the nitrogen fertiliser for a one pass operation. If UAN is sold at a similar price to granular urea (per kg of N) then this will make it an attractive option.

UAN is not compatible with Amicide625 and the herbicide needs to be first mixed with water before adding the required amount of UAN.

When trying out herbicides or fungicides different to those listed in this article it is important to obtain information on compatibility.

Background

Liquid nitrogen fertiliser such as UAN (Urea Ammonium Nitrate, 42% N v/v) is increasingly being used by farmers in Victoria because of:

- the convenience factor of being able to apply N through the boom spray (often together with a herbicide or fungicide)
- no additional tyre tracks in the paddock from the topdressing operation
- better coverage of N (topdressing urea is inherently variable across the paddock)
- ability to apply smaller amounts of N as the crop needs it rather than one big dose of top-dressed urea
- UAN is possibly less volatile than top-dressed granular urea
- the price of UAN is now comparable to Urea.

The negatives of using UAN include:

- UAN is harsh on spray equipment and the boom needs extra care
- UAN needs to be stored in special tanks thus requiring initial capital
- Scorch and crop damage – possible when using on its own or with herbicides and fungicides through flat fan nozzles when conditions are not right.

In 2004, the BCG investigated the effects of crop damage resulting from UAN in combination with some of the most commonly used herbicides and fungicides. The results from 2004 were encouraging in that we found no detrimental effects of UAN in combination with most herbicides or fungicides – however it was a very dry year and the yields were generally poor. In addition, in 2004 we used UAN mixed with water, which may have alleviated the scorching effects.

In 2005, we repeated the trial work because we were confident that the season was going to be better and we included a straight UAN versus a UAN + water comparison as the carrier for the herbicide and fungicides.

Methods

Treatments: 60l/ha UAN and 60l/ha UAN + 20l/ha water with a range of most commonly used herbicides and fungicides

Replicates: 4

Sites: Birchip and Marnoo

Crop: Wheat – Yitpi

Fertiliser: Granulock 10Z 50kg/ha

Herbicides: Triflur480 0.8L/ha IBS

Herbicide and fungicide mixes

The carrier used for the herbicides and fungicides and application timing are presented in Table 1.

Table 1: Carrier rate, pesticide rate and timing used in compatibility trial

Carrier /ha	Pesticide /ha	Timing
UAN 60L	Control 1. no product at all	
UAN 60 L + Water 20L	Control 2. no pesticide only carrier	
	Ally 5g + MCPA LVE 0.3L + wetter 0.1%	GS15
	Tigrex 0.5L	GS 15
	MCPA500 0.35L + Diuron 0.2L	GS 15
	Topik 65ml + uptake 0.5%	GS 15
	Amicide625 1.2L	GS 33
	Bumper 0.25L	GS 33
	Folicur 0.145L	GS 33
	Bayleton (Triad) 1L	GS 33

NOTE: each pesticide was used with UAN at 60L and UAN at 60L + Water 20L

Conditions at time of spraying

Weather conditions at the time of spraying were good – temperatures were low and Delta T ranged from 4 to 6 (Table 2).

Table 2: Weather conditions at the time of application

Growth Stage	Birchip			Marnoo		
	Temp °C	Humidity %	Delta T	Temp °C	Humidity %	Delta T
GS15	17	52	5.5	13	57	4
GS33	18	50	6.0	18	50	6

Spraying was done with Air Mix 110-01 Flat Fan nozzles delivering a fine droplet spectrum.

Monitoring

Crops were assessed 21 days after application for leaf damage.

Results

N response

There was no significant nitrogen response at Marnoo and at Birchip due to the late N applied at GS33 (3rd node) yielding the same as the control (no N) (Table 3). At Marnoo the UAN applied at GS15 (five-leaf) yielded higher than the UAN applied at GS33 (3rd node). At Birchip the variability was higher and no significant differences could be detected. There was no difference at either site between the UAN applied straight or UAN mixed with water.

Table 3: Nitrogen response at Birchip and Marnoo

Treatments	Timing	Yield t/ha	
		Birchip	Marnoo
No N		2.3	3.7
UAN	GS15	3.0	4.1
UAN + Water	GS15	2.5	4.2
UAN	GS33	2.4	3.8
UAN + Water	GS33	2.7	3.8
Significant difference: LSD 0.05		**NS**	**NS**

Pesticide compatibility

There was a significantly lower level of scorch when pesticides were mixed with UAN + Water compared to pesticides with just straight UAN. This effect was largest for Ally + MCPA LVE and Tigrex sprayed out at the five leaf stage (GS15), however the crop recovered quickly and there were no detrimental effects in yield.

In relation to yield, when spraying at the five-leaf stage (GS15) there were no differences found between spraying straight UAN or UAN + Water for a range of the most commonly used herbicides (Table 4). The extra scorch found with some treatments the effects was only short lived and the crop grew through the effect quite quickly.

Spraying late in the season at the third node stage (GS33) there were some important differences observed (Table 4). Amicide625 is not physically and biologically compatible with UAN (it precipitates and flocculates and becomes difficult to spray); this flocculation is alleviated to a large extent if the Amicide625 is first mixed with water before the UAN is added (UAN + water as the carrier). There was also a response to fungicide application at Marnoo, stripe rust was present in the crop and the fungicide spray applications yielded significantly higher.

Table 4: Yield at Birchip and Marnoo for a range of herbicides and fungicides applied at two growth stages when using UAN and UAN + Water as the carrier.

Pesticide	Timing	Birchip yield t/ha		Marnoo yield t/ha	
		UAN	UAN + Water	UAN	UAN + Water
Control	GS15	3.0	2.5	4.1	4.2
Ally + LVE	GS15	2.6	2.4	4.1	4.0
Tigrex	GS15	2.5	2.5	4.0	4.2
MCPA + Diuron	GS15	2.4	2.5	4.0	3.9
Topik	GS15	2.3	2.5	4.2	4.1
Significant difference: LSD 0.05		**NS**		**NS**	
Control	GS33	2.4	2.7	3.8	3.8
Amicide	GS33	2.3	2.3	3.5	3.8
Bumper	GS33	2.1	2.5	4.0	4.3
Folicur	GS33	2.3	2.4	4.3	4.6
Bayleton	GS33	2.5	2.2	4.3	4.3
Significant difference: LSD 0.05		**NS**		**P<0.01 (pesticide) 0.4**	

Interpretation

Conditions at the time of spraying of these trials were not conducive to leaf scorch – temperatures were low and the Delta T ranged between 4 and 6 for all applications. It is expected to get leaf scorch and crop damage when the temperatures are very high (mid 20s and higher) or when the Delta T is very low (ie. when the humidity is very high).

UAN is compatible with the commonly used herbicide mixes: Ally + MCPA LVE; Tigrex; MCPA500 + Diuron; and Topik. There is no need to add water to the UAN to these herbicide mixes to improve compatibility.

UAN is also compatible with the fungicides: Bumper; Folicur and Bayleton (Triad).

UAN as a carrier on its own is NOT compatible with Amicide625. It is not physically compatible and crop damage can also result. When Amicide625 is first mixed with water and then the UAN is added it appears to work better and no crop damage was observed.

Commercial Practice

UAN can be safely mixed with a range of herbicides and fungicides. The only problem we found was with Amicide625, however if the Amicide625 is first mixed with water then the product mixes satisfactorily and we did not observe any negative crop effects.

Best practice for using UAN at rates of up to 60L/ha (as used in this trial) when mixed with herbicides and fungicides:

- If using herbicides or fungicides not in this trial then always do a 'jar' test first for determining the physical compatibility if white clouds or a clear divisions appears, then the two may not be compatible.
- Herbicides and fungicides mix better with UAN if mixed in water first.
- Do not spray at temperatures over 25^{o}C especially after flag leaf emergence because you don't want to scorch the flag leaf! (It is not good practice to spray at higher temperatures anyway).
- Do not spray when the Delta T is below 2 – it appears that leaf scorch is worst when humidity levels are high.