

# Research finds *Fusarium* floats

By Chris Anderson and David Nehl\*

**F**usarium wilt is an important disease of cotton in Australia and is caused by the soil inhabiting fungus *Fusarium oxysporum f.sp. vasinfectum* (Fov). It has long been thought that the fungus can spread around farms during irrigations by moving in water, but there has been little research to measure the extent of movement.

To test this hypothesis, samples of water and floating trash were collected during the irrigation of a crop heavily infested with Fov. Water was collected at the head ditch and both drop boxes in the tail drain, from the return channel and at the lift pump (Figure 1). Samples of floating trash were collected from the head ditch, both drop boxes, and from the return channel (Figure 1).

We isolated *F. oxysporum* from the water samples, and from mud adhering to the trash samples, by using selective media specific for this fungus. It is important to note that not all strains of *F. oxysporum* cause Fusarium wilt. In this study, we measured only the total population of *F. oxysporum* without assessing the proportion of Fov (this will be assessed at a later date). Nevertheless, the total level

of *F. oxysporum* is a good indicator of the level of Fov.

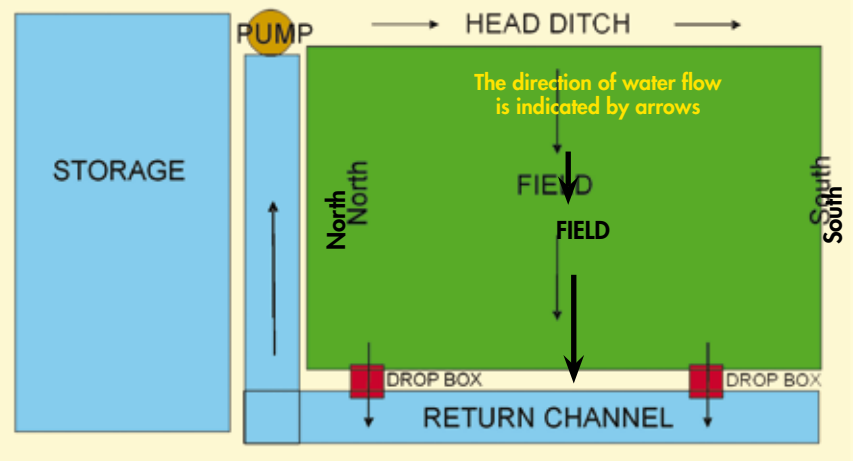
So, what did we find? Most importantly, *F. oxysporum* does move around during irrigations. But most of this movement occurs on floating trash and not in the water. Relatively low levels of *F. oxysporum* were detected in the water (Figure 2). But in floating trash, *F. oxysporum* was present in numbers as high as 160 million colony forming units (CFUs) per kg of trash (Figure 3).

Water from this field is recirculated to the same storage used to irrigate it. Yet water coming out of this storage into the head ditch had almost undetectable levels of *F. oxysporum* (Figure 2).

As this water moved through the field, the level of *F. oxysporum* in the water increased. Water at the drop box at the southern end of the field had higher levels of *F. oxysporum* than water at the drop box at the north end, which corresponds

12 ▷

**FIGURE 1: Sampling points in a field heavily infested with the Fusarium wilt fungus**

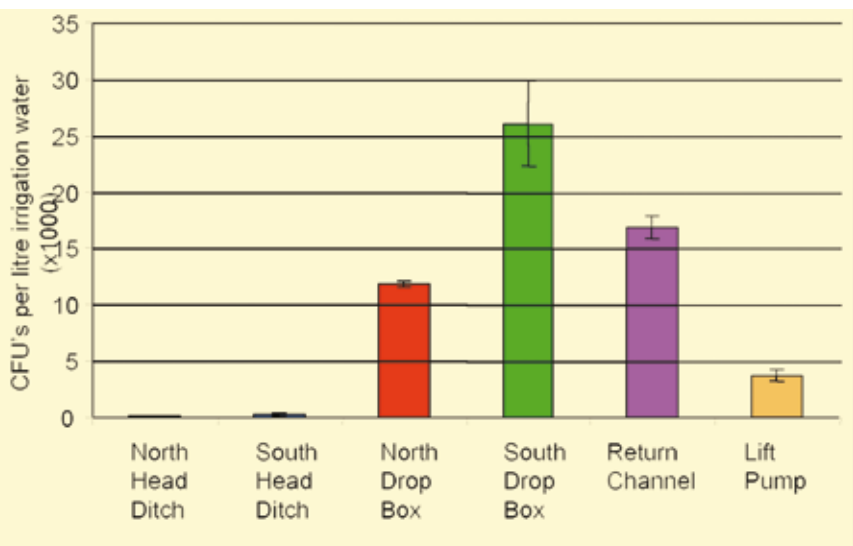


Note: The incidence of Fusarium wilt in the field is indicated by shading, the darker area to the south having a higher incidence of disease than the lighter area to the north.



The greatest movement of *Fusarium* occurs on mud that adheres to floating trash.

**FIGURE 2: Colony forming units (CFUs) of *Fusarium oxysporum* per litre of irrigation water**



## ◁ 10...FUSARIUM FLOATS

with a higher incidence of Fusarium wilt at the southern end.

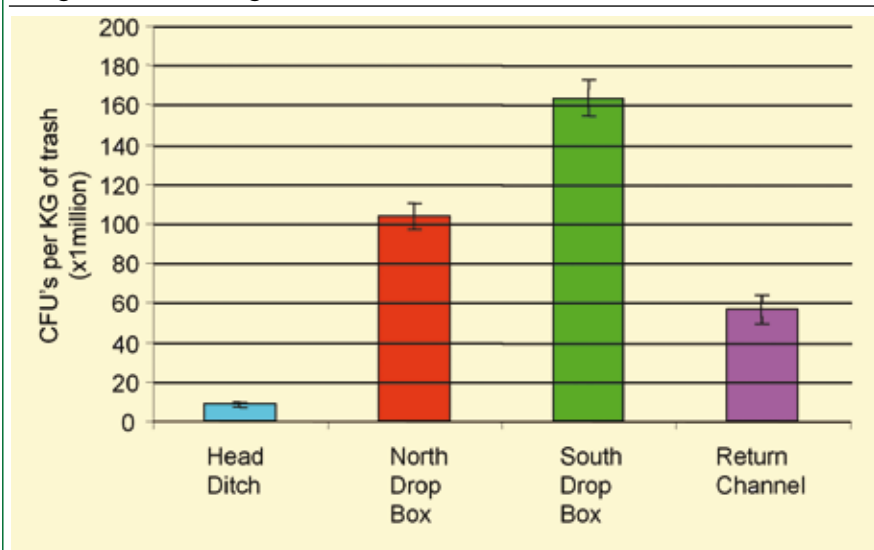
The mixing of water from both drop boxes probably led to the levels of *F. oxysporum* in the return channel being midway between those in the drop boxes. But the level in the return channel fell significantly by the time the water reached the lift pump (Figure 2).

So, it is clear that *F. oxysporum* does travel in suspension in irrigation water, but at very low levels. Furthermore, much of it settles out of the water before it reaches the lift pump and almost all is gone after passage through the storage dam.

By far the greatest movement of *F. oxysporum* occurs on mud that adheres to floating trash. Relatively low levels of *F. oxysporum* were adhering to trash in the head ditch, although these levels were much higher (Figure 3) than what was suspended in water anywhere in the system (Figure 2).

Trash flushed out at each end of the field carried very high levels of the fungus (Figure 3), especially at the southern end which had higher disease levels. The slightly lower levels of *F. oxysporum* on trash in the return channel suggests that some of the fungus washed off the trash

**FIGURE 3: Colony forming units (CFUs) of *Fusarium oxysporum* per kilogram of floating trash**



as it passed through the system, but the levels were still high.

### In conclusion

- *F. oxysporum* does move in irrigation water, but the passage of the water through the return system and storage dam is likely to eliminate almost all of it.
- Much higher levels of *F. oxysporum* are moved around the farm in mud that

adheres to floating trash. So the elimination of trash from the return system is paramount to minimising the spread of Fusarium wilt around the farm.

If you have any further questions about Fusarium wilt, and how to manage it, please contact Chris Anderson on 02 6799 2454.

\* NSW Department of Primary Industries and Cotton Catchment Communities CRC.



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