



Safflower: potential & world adaptability

Sue Knights

SE Knights Consulting, Horsham

in a nutshell

- Safflower is proving to be a versatile crop in winter cereal rotations in a range of cropping environments in the eastern states of Australia
- Field trials in Victoria, New South Wales and South Australia confirm that safflower is a viable crop option, particularly on pre-watered sites or sites with good soil moisture prior to sowing
- Safflower is in demand for producing table margarine, mayonnaise, and salad and cooking oils, and recently has been used as a crop platform to produce proteins for the manufacture of drugs and non-drug products, most notably human insulin

Safflower is a versatile winter-spring growing oilseed crop adapted to a range of environments extending from Tasmania to Queensland. In Australia, it is usually grown as a dryland crop, relying on a deep root system to extract water from the soil profile as the crop matures in late spring or summer.

The crop has a long history of production in China, India, the Near East and North Africa. Historically, safflower has been mainly cultivated for medicinal purposes or to obtain a red dye, carthamin, which was extracted from florets and widely used to colour food and clothing. Although India has been growing safflower for its oil since the late 1800s, it is only since the crop was introduced into the United States in the 1930s that it has developed into the oilseed crop we know today. Safflower is now cultivated in over 60 countries around the world, including India, Mexico and the United States.

Crop opportunities

When grown under reasonable conditions safflower can produce seed with up to 40% oil and the remaining meal can be incorporated into livestock rations. The oil is considered superior to other vegetable oils in many ways. Some cultivars produce oil that is highly polyunsaturated, having more linoleic fatty acid than many other vegetable oils currently grown. Other cultivars contain high levels of oleic acid giving similar health and cooking properties to olive oil. Like sunflower oil, both types of safflower oil contain no linolenic fatty acid, which results in great stability and a long shelf life. For these reasons safflower is in demand for producing table margarine, mayonnaise, and salad and cooking oils. More recently safflower has been utilised as a crop platform to produce proteins that can be used to manufacture drugs and non-drug products, most notably human insulin.

Opportunity crop

Safflower is a minor oilseed crop in Australia, but it can be easily included as a rotation crop within winter cereal based farming systems. No additional equipment is required for safflower production. In Australia, it has a reputation as being an opportunity crop, meaning that it is often grown when conditions suit the sowing of a spring sown crop.

Safflower is often sown and harvested later than wheat, which can be an advantage when sowing rains come too late for traditional winter crops, or when too much rain prevents sowing or their survival.

The later sowing of safflower also gives more time for weed control and can help spread sowing and harvesting workloads too.

Safflower's deep roots and ability to extract water from deep in the soil profile allows reasonable yields even with little post-sowing rain.

Incorporating safflower into rotations can also help reduce the build up of cereal diseases, as life cycles are disrupted without a non-grass host.

Furthermore, irrigated crops such as cotton can yield higher following safflower, as safflower's extensive root system can dry out soil profiles causing the shrinking and cracking of compacted layers and allowing better root development of the next crop.

Field credentials

A survey was conducted by Nick Wachsmann from the University of Melbourne in 2001 to establish the reasons why growers were incorporating safflower in their cropping rotations in southern Australia. The results confirmed the versatility of the crop and established that:



- 39% of growers surveyed were using safflower to control weeds
- 22% to spread sowing and harvesting workloads
- 20% to break cereal disease life cycles
- 15% to dry soil profiles
- 15% for financial gain
- 12% to open the soil with its roots.

The survey also revealed that most growers sowed safflower in August or September, and average yields ranged from 0.7 to 1.7 t/ha.

Further agronomic work by Nick Wachsmann to confirm the performance of safflower as a spring sown crop in the Wimmera region of Victorian proved positive. Safflower was sown in mid-spring on two sites, one rain-fed and having a total soil water content of 737 mm to 2 m depth and the other being pre-watered to give a total soil water content of 902 mm to the same depth. Both sites received 80 mm of rainfall for the period between sowing and harvest. On the rain-fed site safflower yielded around 1.0 t/ha and on the pre-watered site yields approached 3.5 t/ha. This and other work in Victoria, South Australia and New South



Figure 1: Trial work confirms that safflower can be a viable spring sown crop option in the southern regions of Australia, especially where the soil profile is reasonably wet at sowing.

Wales confirms that safflower can be a viable spring sown crop option in the southern regions of Australia, especially where the soil profile is reasonably wet at sowing as a result of rainfall or retained moisture from a previously irrigated crop.

International conference in Wagga Wagga

Australia has been given a unique opportunity to host the 7th International Safflower Conference in 2008. This will provide an tremendous opportunity for interested people to make contacts and learn about world developments in safflower including breeding and germplasm, agronomy and production issues, oil and meal quality and safflower products including cut flower, cosmetics and biodiesel. 🌻

Further information

Sue Knights

T: 03 5382 5427

E: sknights@netconnect.com.au

To register your interest in the 7th International Safflower Conference go to www.australianoilseeds.com



Figure 2: Nick Wachsmann in a field of mature safflower at Longerenong College, Horsham, where the crop was shown to be a viable opportunity crop in winter cereal based cropping programs.