

The Impact of **FBS Transit**[®] During Frost Years

How To Weather Frost Damage

RESEARCH SUMMARY

FBSciences has research from several years on several crops around the world that have shown dramatically higher yields (30% to 64%) during frost years. Some crops are inherently more cold- and frost-tolerant than others. It is widely known that the main mechanism for frost resistance on such crops is maintaining a higher internal sap sugar and soluble solids content. If plants are healthy enough, they can raise their internal sugar and brix levels. **Research shows that crops with higher brix levels are more tolerant to frost.** We call this the "Anti-Freeze" mechanism.

Looking at the results of our newest research report outlined below, **FBS Transit**[®] helps improve the nutrient efficiency of plants which leads to healthier plants that can better withstand stresses. These healthier plants are able to increase their brix levels **in as little as two days**. The findings also show that the effect lasted as long as 30 to 40 days.

Weather in the springtime can be unpredictable. Make sure you apply Transit Soil[®] or Transit Foliar[®] at the standard recommended rate at least a few days before a frost event occurs.

The "Anti-Freeze" Effect

The "Anti-Freeze" effect in crops can easily be understood using the illustration of automotive anti-freeze. Ethylene glycol is a common ingredient in many such products. It works because it is a sugar alcohol that is very soluble. When it is added to water, the freezing point drops drastically. Plants achieve the same thing by concentrating sugars and other soluble solids (like potassium, magnesium, sodium, etc.) in their sap.

Some agronomists and researchers have developed simple methods to monitor soluble solids in plant sap. They use a garlic press and a brix meter to do so.

Craig Ross is one such agronomist and contract researcher in Victoria, Australia. He routinely monitors sap brix in all of the crops grown in his region because it is so subject to frost damage. With over more than a decade of research on this topic, he has concluded that crops with higher internal brix levels resist crop loss from frost events to a far greater extent than those with lower brix levels.

NEW RESEARCH FINDINGS

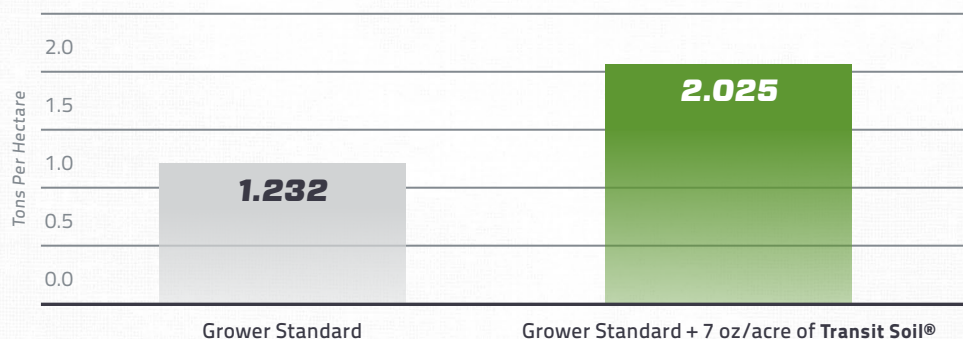
FBSciences and our partners conducted replicated trials with **FBS Transit** on wheat, chickpeas and lentils for each of the last four growing seasons. In each of those trials, Ross reported dramatic and statistically significant increases in internal sap brix levels and higher yields.

But his work on lentils at the end of 2017 shed even more light on how **FBS Transit** impacts sap brix, frost damage, and yields. In this trial there was a very significant frost event late in bloom and deep into pod fill on November 4, 2017. A single application of **Transit Soil** at 7 oz/acre at the 5th vegetative leaf stage resulted in an amazing 64% yield increase. See *Figure 1* on the next page.



NEW RESEARCH FINDINGS *Continued*

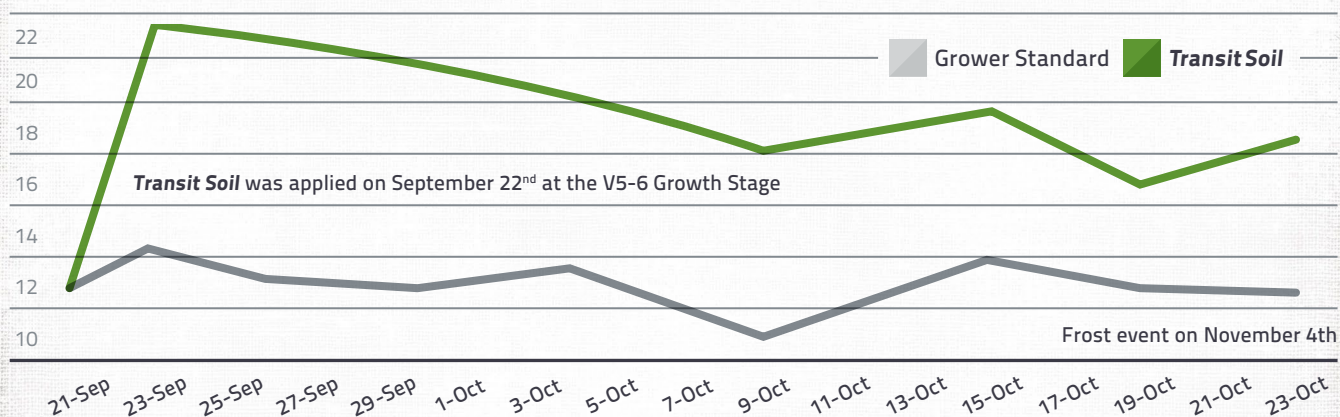
64% YIELD INCREASE Yield Response to **Transit Soil** - Figure 1



Ross stated in his report, "It appears the treatments containing **FBS Transit**® have given a significant yield increase. The refractometer readings [which measures sugar levels] were also exceptionally high for those treatments containing **FBS Transit**. These elevated sugar levels were maintained for several weeks."

In fact, the increase in internal sap brix was evident within 48 hours of the application. We found that amazing. More amazing to us was that Ross found the sap brix stayed higher for at least 30 to 40 days.

SAP BRIX READINGS - Figure 2



Ross also reported, "It appears that the majority of the yield increases in plots with higher yields could be attributed to the buffering of severe frost damage (by increased plant sugar levels) that has been rated up to 80% in the local district in pulse crops including lentils. However, results... may have also been related to better plant health in general, or a combination of both."

Ross told us that frost damage in the surrounding lentil fields that were untreated had losses of 70-80%. It was unfortunate for the non-treated fields because up until the frost event, weather and rainfall had been close to ideal. The 2-ton yield in the **Transit Soil**® treated fields was about double what the area average is for lentils during most years when rainfall is not adequate. Without **Transit Soil**, a 1.2-ton yield was acceptable for an average year. But, growers who used Transit Soil were clearly smiling all the way to the bank!



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