Cold tolerance in hemp and its potential in a winter-sown dryland crop rotation

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Industrial hemp, like countless other summer crops, is grown in many countries under a wide variety of climatic environments – latitude, day length, temperature, altitude, humidity and sunshine hours.

In many parts of Australia, it is considered a summer-only crop, although it is also grown in the northern subtropics and tropics, where the weather is hotter in winter. Where summer rainfall is low and evapotranspiration rates are high, it is mainly irrigated, especially in southern Australia's cropping belts, which have Mediterranean climates. However, from our observations in different locations over the past 15 years, and recently in consulting to AgriFutures Australia's Industrial Hemp Variety Trials, we have noticed the strong winter survival traits of the cannabis plant, including a generally strong ability to not only germinate, establish and grow in cooler winters, but survive and thrive, and handle frost events (down to –5 °C) as a seedling.

This phenomenon will be shown in numerous photos we have taken of crops established and growing vigorously in mid-winter across Australia. These crops can finish as a normal, commercial biomass, grain or dual-purpose crop if they are the appropriate variety, e.g., if the variety is auto flowering or photoperiod responsive. Our hypothesis is that this ability to handle cold weather and chilly climates during the early growth stage, depending of course on the latitude, variety and location, will open hemp up as not only a summer crop, but also a winter/spring crop.

For dryland growers, planting prior to winter allows crops to establish and grow vegetatively through a cool, moist wet winter/spring and be harvested before the onset of hot, dry summer conditions typical of southern Australia's Mediterranean climate. Peer review, personal communications and literature on this topic from the European Union, northern India, Canada and Russia also suggest a unique opportunity exists to grow industrial hemp as part of a winter cropping regime. For example, in Russia, it is claimed that seedlings can handle –15 °C once established, although the plants still required an average maximum day temperature of above 12 °C.

It is noted, however, that industrial hemp does not tolerate heavy frosts during the late vegetative and flowering/grain fill stages, and severe grain losses have occurred, including in Queensland. The anecdote is that hemp's cold/frost tolerance seems to reduce with age from seedlings to grain fill. If anyone is interested in being involved in this initiative nationally this

winter, and has a licence to grow industrial hemp, we have new and old varieties we would like to trial for either grain, dual purpose or biomass scenarios.