

Submission for : **Inquiry into Water Use Efficiency in Australian Agriculture**

I understand that the Standing Committee for Agriculture and Water Resources is enquiring into Water Use Efficiency in Australian Agriculture.

My submission relates to one fundamental aspect about productivity. It concerns plant productivity per unit of water applied.

Plant production occurs throughout the Murray Darling Basin. It can be achieved in high rainfall zones with assistance from irrigation, and at the other extreme, in arid zones where there is an enormous difference in plant production (e.g. tonnes of Dry Matter per hectare) achieved from water applied. This happens across all types of plant production systems.

A simple example could contrast farms that 'double crop' say with a cereal winter crop and a summer crop of maize. The example examines the situation in 20" (500mm) and 10" (250mm) rainfall districts. Rainfall provides 5MI/ha and 2.5MI/ha in these two situations. The crops also receive irrigation water. The water needed is determined largely by evapotranspiration (Et) losses. Evapotranspiration losses determine water application rates, with prudent irrigators using published Et data to plan irrigations.

Typically in a 200 day summer irrigation period evapotranspiration losses can vary by 1mm/day in the 20" and 10" rainfall zones. This is an extra 200 mm of evapotranspiration loss that must be satisfied before providing for plant needs. This equates to another 2MI/ha.

These two considerations shows that the 250mm rainfall zone received 2.5MI/ha less water from rain and needs another 2 MI/ha to overcome higher evapotranspiration rates. Collectively this is 4.5MI/ha. The actual difference will depend on the districts being compared.

The plant production in the semi arid zone will be less. Typically 6 to 7tDM for the winter cereal crop, compared to at least 10tDM in the 500mm rainfall zone. The summer crop yields also vary and may typically be about 16tDM and 23tDM respectively for maize harvested as whole crop silage.

Annual production is $6 + 16 = 22\text{tDM}$ compared to $10 + 23 = 33\text{tDM}$. The efficiency of water use by the plants is very different. The 22tDM has used 2.5 MI/ha from rainfall and will need 10 to 12 MI/ha from irrigation, whereas the 33tDM was achieved from 5 MI/ha of rainfall and perhaps 6 to 7 MI/ha from irrigation.

I have double cropped in our 450mm rainfall zone for many years. The crops are used to provide high quality (greater the 10 MJ or ME per Kg DM) silage. Cereal crops normally achieve at least 10tDM/ha and maize at least 23tDM/ha. Irrigation water use is typically 2MI/ha for the winter crop and 5.5MI/ha for the maize crop.

Plant production suffers in the lower rainfall zone of the MDB because of the greater number of days with higher temperatures which severely effect plant respiration rate and photosynthesis rate. A lengthy discussion could examine aspect of plant physiology which interacts with temperature. These relationships are becoming more important as effects of climate change are observed. Behaviour of plant stomata under challenging conditions is another major physiological factor determining plant production.

This quick example shows that the 500mm rainfall zone is around 40 to 50% more efficient in producing plant material from water. Clearly there is a range in plant production efficiency across the spectrum of climate zones in the Southern Murray Darling Basin.

The efficiency indicated above becomes even greater when water conveyance losses are included to account for seepage and evaporation as water moves along the river.

The biological realities determining efficiency of water use are not the apparent drivers in trends in deployment of irrigation water. Large irrigation developments in the semi-arid zones of the southern MDB , usually to permanent plantings, are driving water demand. The consequence is that significantly less water is available in higher rainfall zones. Further delivery systems for irrigation water in these areas is becoming much less affordable as infrastructure costs have to be financed by less water.

Overall, we are witnessing diminished water productivity with current trends in irrigation development. This trend highlights the inadequacy of ACCC policy which allows water to go to the highest current bidder. The policy allows short term (say 10 years) demands to have major implications on where and how resources are deployed. No incentive is given to use our scare water resources where they can be more productive.

This submission has been prepared in haste as I only became aware of your inquiry yesterday. My farming activities must take priority at this time of year.

However if your Committee was interested, I could prepare a more detailed and substantial report. Perhaps this could be presented to the Committee if it is in our area.

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