Mexican wheat trials boon for Australia

By **NEIL LYON**

THE Yaqui Valley in north-west Mexico is an oasis of irrigated agriculture surrounded by a vast desert – an environment which is surprisingly ideal for breeding and developing wheat varieties suited to Australian conditions.

Many of Australia's wheat varieties have been developed by the Mexico-based international research organisation, CIMMYT, in the Yaqui Valley.

Key to the research is one of CIMMYT's largest research stations, the Norman E. Borlaug Experimental Station (CENEB), which sits in the middle of the valley's 220,000 hectare irrigation scheme where the average annual rainfall is between 250 and 300mm.

CIMMYT Board of Trustees chair and South Australian farmer Andrew Barr said the advantage of the station for developing Australian-suited varieties was that it was in an irrigated desert where researchers could tightly control water and growing conditions.

Mr Barr said in earlier years researchers used to fully irrigate the trial crops which masked genetic variation for some of the stresses that were important in different parts of the world, particularly Australia, "where we know way too much about drought and heat stress".

But in the last 10 years CIMMYT has purposefully refocused its trials to target a range of different sowing times and moisture regimes.

"The station still has early-sown, full irrigation with seven or eight tonnes/hectare yield potential," Mr Barr said.

"But now it also sows late crops, with water, which forces the wheat to develop in late spring/summer heat stress.

"It is not drought-stressed, just heat-stressed," he said.

"The station also has early sowing, but instead of a full irrigation system, drip lines are used which modify the water to get 4t/ha, and also modify it to get 2t/ha.

"So now at the one station we have trials that yield 8t/ha, 4t/ha and 2t/ha, experience drought and heat, heat alone or grown to full potential."

Mr Barr said it was more difficult to run such a range of different climatic scenarios – including testing for drought – under Australian conditions.

"In Australia the irony is that rain always gets in the way of a good drought from a breeder's perspective," he said.

"You have a drought every four or five years, but in the Australian environment it becomes difficult for a breeder because you make progress in a drought year but the next one is a bumper crop whereas in Mexico there is no rain to get in the way.

"CIMMYT can generate the different conditions year-in, year-out."

The dry climate and capacity to control crop development through irrigation have also seen Mexican farmers in the Yaqui Valley modify the type of crops they produce.

Mexican wheat specialist and CIMMYT Conservation Agriculture Program principal scientist Ivan Ortiz-Monasterio said where the valley was once a major bread wheat-producing area, today the emphasis is on durum wheat supplying the domestic market and lucrative niche markets throughout the world.

❒ Mexican wheat breeder and CIMMYT Conservation Agriculture Program principal scientist Ivan Ortiz-Monasterio.

"We have a comparative advantage in terms of producing very high quality durum because we have a very dry climate and irrigation," Mr Barr said.

"The type of durum people have access to in Europe, for instance, varies a lot from year to year because it is rainfed.

"The variation in quality is a hassle for the industry.

"But here we can produce very consistent quality year after year, with good fertiliser management and the industry loves that."

Unusually, durum yields in the Yaqui Valley are higher than bread wheat yields – sometimes 0.5 tonne/hectare more.

And over the past two years, thanks to the introduction of a new variety, Cirnio, irrigated durum yields have risen from an average of 5-6t/ha to 6-7t/ha.

"That is something that hasn't happened over the last 35 years," Mr Ortiz-Monasterio said.

He said with such a focus on wheat production in the valley, the World Bank and Mexican government had been trying to diversify production.

"They ask why the farmers are using so much valuable water to grow wheat and not higher value crops," he said

"It is a good question, but if you start to grow vegetable crops you very quickly start to saturate markets we have access to.

"Wheat is a very easy crop to manage. And farmers have been making very good money growing wheat.

"The better farmers investing $US1000/ha were getting back $US2000/ha.

The average usage of irrigation water for a wheat crop over a whole growing season in the Yaqui Valley is 7.5 megalitres over four waterings.