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Mr Cameron Stack  
ACIP Secretariat  
PO Box 200  
WODEN ACT 2606



Dear Cameron,

Attached are comments on the "Review of enforcement of PBR - Issues Paper" recently released. My co-workers and I would like these to be considered for the final recommendations.

We would also be interested in taking part in any consultation process prior to the release of the final report.

Yours sincerely,

Ian L. Batey  
(Honorary Research Fellow)

## "A review of enforcement of Plant Breeder's Rights: ISSUES PAPER"

Comments on the questions relevant to recent VAW CRC research:

**Question 8:** Is evidence collection constraining your ability to undertake legal redress in PBR matters?

and

**Question 9:** What changes would assist breeders (and their legal advisers) in obtaining sufficient evidence to successfully undertake appropriate enforcement measures? What other ideas may help alleviate the difficulties in obtaining evidence?

Samples are collected from every load of grain delivered to receival silos. While these may be the basis of collection of data about the compliance of growers in declaring varieties with end-point royalties, this system in its present form is unlikely to be sufficient to allow a successful prosecution to proceed. For that, protocols would need to be implemented, which would see the sample labelled, sealed, and probably a duplicate sample, similarly labelled and sealed, given to the grower for his own testing should he desire.

Before instituting such complex protocols, it would be better to gain an understanding of the degree of compliance in declaration of grain varieties by a large study of grain lots delivered to silos and directly to processors.

**Question 18:** Are difficulties in varietal identification constraining your ability to enforce your PBR right effectively? Please document your concerns and, if possible, provide quantitative estimates of losses.

Evidence of a 98.8% compliance rate was provided by a (limited) survey of 250 wheat samples delivered at ten receival sites in southern NSW (Griffith area) and Victoria (Swan Hill area) from December 6<sup>th</sup> to December 12<sup>th</sup>, 2005. This exercise demonstrated that the verification of wheat varietal declaration could be performed under the conditions of the country grain-receival site almost in "real time". Results were provided in less than an hour for a set of ten analyses. The equipment responsible was the Agilent Lab-on-a-chip by which grain-protein composition was determined, as a "fingerprint" of variety (see further details below in answer to Question 19). Details were presented to the RACI Cereal Chemistry Conference in Perth, September, 2006, and the written paper is being published in "Cereals 2006".

(Batey, I.L., Uthayakumaran, S., Hickey, L., Dines, J., Miskelly, D., and Wrigley, C.W. Variety identification at grain receival. Cereals 2006. Proc. 56<sup>th</sup> Australian Cereal Chemistry Conference, Perth, in press).

**Question 19:** Would you suggest alternative variety identification options that may address your concerns?

A major breakthrough in methodology for variety identification has been made in recent years with development of portable equipment for micro-fluidic capillary electrophoresis, using the Agilent Lab-on-a-chip system. The actual analysis of protein composition takes only 50 seconds. Normally ten wheatmeal samples are analysed in a batch (one protein chip). Results for the ten samples are provided in less than an hour, including sample preparation (protein extraction) and application, and the interpretation of results. Deployment of the equipment at the grain-receival silo has been demonstrated, as described in the comment above on Question 18.

The system can distinguish between most of a set of 40 current Australian wheat varieties, but there are a number of varieties which cannot be distinguished from each other. In the format in which it was operated, the results were mainly confirmatory; that is, the matching of a presented sample with a genuine sample of the declared variety. If the samples do not match, it is a very difficult task to perform an identification unless it was to be compared with a range of other genuine samples. In addition, there are a number of important varieties (for example, Yitpi and Frame) that cannot be



distinguished from each other in the protein format. Our main use of the method has related to variety identification of wheat, but its potential has been demonstrated for a range of grain species. See publications below.

- Uthayakumaran, S., Batey, I.L., and Wrigley, C.W. 2005. On-the-spot identification of grain variety and wheat-quality type by Lab-on-a-chip capillary electrophoresis. *Journal of Cereal Science* 41:371-374.
- Siriamornpun, S., Suttajit, M., Uthayakumaran, S., and Wrigley, C.W. 2005. Protein analysis for efficient screening of rice for variety and quality. *Food Australia* 57: 448-450.
- Wrigley, C.W., Batey, I.L., Uthayakumaran, S., and Rathmell, W.G. 2006. Modern approaches to food diagnostics for grain quality assurance. *Food Australia* 58, 538-542.
- Uthayakumaran, S., Batey, I.L., and Wrigley, C.W. 2005. Variety identification to suit the needs of industry. Pages 171-175 in: *Cereals 2005. Proc. 55<sup>th</sup> Aust. Cereal Chem. Conf.* C.L.Blanchard, H.Truong, H.M.Allen, A.B.Blakeney and L.O'Brien, Eds. Royal Aust. Chem. Instit., Melbourne.
- Batey, I.L., Uthayakumaran, S., Barker, N., and Wrigley, C.W. Rapid identification of barley varieties. *Cereals* 2006. Proc. 56<sup>th</sup> Australian Cereal Chemistry Conference, Perth (in press)

An additional use of the Agilent Lab-on-a-chip system is for variety identification based on DNA analysis, but this application is currently **CONFIDENTIAL**, due to the development involving industry collaboration. The same equipment is used as for protein analysis, but a DNA chip is used, and the sample extraction procedure is more complex and time-consuming. Nevertheless, greater discriminating ability is provided, as indicated by analyses of Australian wheat and barley varieties. The distinction between Yitpi and Frame may be made quite easily with this approach.

**Question 20:** Do molecular technologies have significant utility for reducing low compliance rates in variety identification? Do these technologies require additional development to improve their utility? Please document your reasons.

DNA micro-array technology offers a further advance in the provision of highly discriminating variety identification, taking advantage of the capability to process large numbers of samples, with large numbers of distinguishing probes. For this purpose, Triticarte Pty Ltd was established by the Value Added Wheat CRC and Diversity Arrays Technology (DARt) Pty Ltd, based on the DARt platform. This system is primarily designed for a whole-genome analysis for plant breeders, but it additionally offers an efficient means of determining the identity of genotypes (wheat and barley, at present).

While significant numbers of current Australian grain varieties have been subjected to this technology, a complete library for all varieties has not been created. In order to utilise this technology effectively, such a library would be required, so as to allow a comparison of an unknown sample with its supposed entry in the library. In the case of a mis-match, the library should allow positive identification of the sample. The large numbers of markers available should permit the establishment of unique patterns for each variety.

Libraries of patterns would be needed for any test to be used. The creation of such libraries would need to be carried out, presumably funded by those groups with an interest in reliable identification of varieties.

In the process of carrying out the suggested study of compliance (see Question 9), the basis of a library could be established for whatever technology is adopted.

**Question 21:** Would you support the establishment of a central coordinating body for plant breeders to assist with enforcement? Please provide reasons for your view and indicate which of the above functions should be undertaken by such an entity.

Individual breeders are unlikely to be able to carry out the required testing and maintain a library of known varieties. A central body to coordinate this would assist breeders to pursue their rights effectively. It would not be necessary for such an organisation to actually carry out the testing – this is available commercially. This body could coordinate such testing so as to provide an economic test service for all breeders. If a library of patterns for all Australian varieties were to be established (using any technology currently available), it would also be an appropriate organisation to create and maintain such a library.

**We would be interested in participating in the proposed consultation process.  
Contact details are .....**

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