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GENEVA

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GENOTYPING OF POTATOES

Document prepared by experts from the United Kingdom

1. At the seventh session of the Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular (BMT), held in Hanover, Germany, from November 21 to 23, 2001, preliminary work on the use of DNA microsatellites (simple sequence repeats, SSRs) for variety identification in potatoes was reported. In this paper, the next stages of the work are described, along with the results of a survey using the methodology, plus a summary of other potato genotyping work in which NIAB is currently involved.

2. Initially, 10 SSRs (on different linkage groups) were selected following a screening and evaluation exercise, and were used to analyse 50 varieties (three tubers from each variety). Following this, five SSRs were selected, which were usefully polymorphic and gave good, easily scored and reproducible products (bands/alleles) when analysed on a Li-Cor automatic sequencer. The SSRs are all publicly available. The separation coefficients of the five SSRs varied between 0.77 and 0.92 (when assessed on 50 varieties) and it was possible to distinguish between all of the varieties by using a specific combination of two of them, plus any one other. The results were found to be both repeatable and reproducible, and there was no effect of the growing site or season on the SSR profiles. A more extensive check on the intra-varietal uniformity of varieties found a very low level of heterogeneity in two varieties at

one SSR locus – subsequent investigations have lead us to believe that this was actually the result of varietal admixture rather than non-uniformity.

3. This work has now been extended, and a database produced of 150 potato varieties, analysed using the five selected SSRs. The analysis has been transferred to an ABI 3100 sequencer, enabling higher and more automated throughput. A minimum of three tubers from a variety were examined before a variety was included in the database. This methodology has been utilised in a survey of the potatoes being offered for sale in the UK (funded by the Food Standards Agency). The results showed, in summary, that of 448 samples analysed (from various retail outlets within the UK), 11.6% were not labelled with a variety name. Of the remainder, 22.4% were incorrectly labelled.(i.e. the variety was not as stated). In addition, in a small number of cases (2.2%) the sample contained more than one variety.

4. NIAB is also a partner in an EU-funded project, GEDIFLUX, part of which is concerned with genotyping a range of both modern and older potato varieties collected from around Europe. In total, c. 500 varieties are being analysed using 15-20 SSRs. Some common morphological characteristics of these varieties are also being collated.

5. As a result of this work, NIAB is an excellent position to begin to examine the use of SSRs for DUS testing in potatoes, in collaboration with appropriate DUS experts. Either an Option 2 or Option 3 approach could be envisaged as a starting point.

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