# INFORMATION ON BLACK SIGATOKA PEST RISK ASSESSMENT

Biosecurity Australia has received a request for specific additional quantitative information relating to Scenario B in the black Sigatoka risk assessment contained in the *Revised Draft Import Risk Analysis Report for the importation of Cavendish bananas from the Philippines*.

The stakeholder consultation period for the revised Import Risk Analysis (IRA) report closed 29 June 2007.

Some of the information contained in the report is complex and involved a number of calculations and the interpretation of expert opinions. However, it is important to recognise the role that this report plays in eliciting comment from as many stakeholders as possible without the report being unduly complex and technically burdensome. Care therefore needs to be exercised in drawing conclusions simply from the quantitative data without the benefit of the expert opinion that accompanies this.

In the interests of transparency this information has been provided to all stakeholders.

12 September 2007

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## 1. The formulas used to calculate the "likelihood of transfer" in Section 10.13

In Section 10.13, the values for Factors 1, 2, 3 and 4 are multiplied together to determine the transfer values.

The values for Factors 1 and 2 are the values given in the text. Factor 3 is found by multiplying the likelihood of suitable weather conditions by the proportion of infected waste from which spores would be uplifted (the calculation of which is described at Point 3 below). The calculation for the value for Factor 4 is given at Point 2.

## 2. The formula used to calculate "Factor 4" in Section 10.13

For both Sections 10.6 and 10.13, Factor 4 uses the formula $1 – (1 – b \times p)^s$ where b = area of host surface as a proportion of the area of the proximity zone, p is the efficacy with which spores adhere to host plant surfaces, and s is the number of viable spores uplifted. The values used are those given in the text.

## 3. The calculation of the proportion of waste from which viable spores would be uplifted (used to calculate "Factor 3" in Section 10.13)

Because only a few spores will be uplifted from a piece of infected waste, there will be some pieces of waste for which no spores will be uplifted. A binomial distribution was used to determine the probability that no spores would be uplifted.

For the unrestricted scenario, approximately 1% of the 100 spores will be uplifted. Hence the proportion of times for which no spores would be uplifted from infected waste is about 36.6%. This was rounded down to 35% to give the figure cited on page 127 and used to calculate the proportion of pieces of infected waste from which spores would be released (65%).

**4. The effect of the mitigation measures in calculating "Factor 3" in Section 10.19**

The risk mitigation measures either reduce the number of spores on a piece of infected waste, the proportion of spores that are viable, or both. This results in a smaller probability that viable spores are uplifted and affects the number of viable spores uplifted if any spores are uplifted.

When considering fruit from areas of low pest prevalence, the level of spores on bananas would be reduced by at least 90% (p 136). Hence there would only be 10 spores (rather than 100) that might be uplifted. The calculation method of Point 3 to determine the probability that any spores would be uplifted was repeated with the same 1% uplift rate but only 10 spores on the banana. The calculated value of 0.096 was rounded to 0.1 for use in the calculations.

For the scenario in determining the effect of the risk mitigation measures the IRA team considered that the mitigation measure will reduce the proportion of fingers from which spores are uplifted to about 10% compared to 65% for the unrestricted scenario. Hence the proportion of fingers from which spores would be uplifted is approximately 15% of the unrestricted value, equal to the change in the transfer values used in the calculations.

The same argument applies to trash minimisation although the reduction is not as great. The calculation was based on 15 spores being on the banana and a 1% uplift rate.

Post-harvest treatment does not reduce the number of spores on bananas, but does reduce the proportion that are viable to about 10%. Hence the proportion of the 100 spores that are uplifted and viable is only 0.1%. Using the method of Point 3 to calculate the probability that viable spores are uplifted gave the result 0.095. The rounded figure of 0.1 was used in the calculations.

The effects of the single mitigation measures are combined when considering a systems approach that uses several of the measures. Combining low pest prevalence and trash minimisation means that there would be only 1 spore (rather than 100) on a banana that might be uplifted. The likelihood of this occurring and the spore being viable is 1% if post-harvest treatment is not used and 0.1% if it is used.

In addition, for the two system approaches considered in detail in the report, only one spore would be uplifted if any spores were uplifted, compared to one or two spores for the unrestricted scenario and the scenarios involving a single mitigation measure. This is taken into account when calculating the maximum value for Factor 4 for the scenarios (as outlined in Point 2).

## 5. Tables corresponding to Table 10.10 for different risk mitigation options for Scenario B for black Sigatoka

**Table 10.19A: Areas of low pest prevalence**
**Table 10.22A: Post harvest treatment**

| Exposure groups | Controlled waste | Uncontrolled household waste | Other uncontrolled waste |
|---|---|---|---|
| **Grower areas** | | | |
| commercial crops | U(8.00E–10, 7.16E–09) | U(5.60E–06, 1.43E–04) | U(5.60E–06, 1.43E–04) |
| home gardens | U(8.00E–10, 2.40E–09) | U(5.60E–06, 4.79E–05) | U(5.60E–06, 4.79E–05) |
| other plant communities | U(8.00E–10, 2.40E–09) | U(5.60E–06, 4.79E–05) | U(5.60E–06, 4.79E–05) |
| **Other areas** | | | |
| commercial crops | U(4.00E–10, 4.77E–09) | U(2.80E–06, 9.54E–05) | U(2.80E–06, 9.54E–05) |
| home gardens | U(4.00E–10, 1.60E–09) | U(2.80E–06, 3.19E–05) | U(2.80E–06, 3.19E–05) |
| other plant communities | U(4.00E–10, 1.60E–09) | U(2.80E–06, 3.19E–05) | U(2.80E–06, 3.19E–05) |

**Table 10.21A: Trash minimisation**

| Exposure groups | Controlled waste | Uncontrolled household waste | Other uncontrolled waste |
|---|---|---|---|
| **Grower areas** | | | |
| commercial crops | U(1.20E–09, 1.07E–08) | U(8.40E–06, 2.15E–04) | U(8.40E–06, 2.15E–04) |
| home gardens | U(1.20E–09, 3.59E–09) | U(8.40E–06, 7.19E–05) | U(8.40E–06, 7.19E–05) |
| other plant communities | U(1.20E–09, 3.59E–09) | U(8.40E–06, 7.19E–05) | U(8.40E–06, 7.19E–05) |
| **Other areas** | | | |
| commercial crops | U(6.00E–10, 7.16E–09) | U(4.20E–06, 1.43E–04) | U(4.20E–06, 1.43E–04) |
| home gardens | U(6.00E–10, 2.40E–09) | U(4.20E–06, 4.79E–05) | U(4.20E–06, 4.79E–05) |
| other plant communities | U(6.00E–10, 2.40E–09) | U(4.20E–06, 4.79E–05) | U(4.20E–06, 4.79E–05) |

**Table 10.24A: Areas of low pest prevalence and trash minimization**

| Exposure groups | Controlled waste | Uncontrolled household waste | Other uncontrolled waste |
|---|---|---|---|
| **Grower areas** | | | |
| commercial crops | U(8.00E–11, 3.60E–10) | U(5.60E–07, 7.20E–06) | U(5.60E–07, 7.20E–06) |
| home gardens | U(8.00E–11, 1.20E–10) | U(5.60E–07, 2.40E–06) | U(5.60E–07, 2.40E–06) |
| other plant communities | U(8.00E–11, 1.20E–10) | U(5.60E–07, 2.40E–06) | U(5.60E–07, 2.40E–06) |
| **Other areas** | | | |
| commercial crops | U(4.00E–11, 2.40E–10) | U(2.80E–07, 4.80E–06) | U(2.80E–07, 4.80E–06) |
| home gardens | U(4.00E–11, 8.00E–11) | U(2.80E–07, 1.60E–06) | U(2.80E–07, 1.60E–06) |
| other plant communities | U(4.00E–11, 8.00E–11) | U(2.80E–07, 1.60E–06) | U(2.80E–07, 1.60E–06) |

**Table 10.25A: Areas of low pest prevalence, trash minimization and post harvest treatment**

| Exposure groups | Controlled waste | Uncontrolled household waste | Other uncontrolled waste |
|---|---|---|---|
| **Grower areas** | | | |
| commercial crops | U(8.00E–12, 3.60E–11) | U(5.60E–08, 7.20E–07) | U(5.60E–08, 7.20E–07) |
| home gardens | U(8.00E–12, 1.20E–11) | U(5.60E–08, 2.40E–07) | U(5.60E–08, 2.40E–07) |
| other plant communities | U(8.00E–12, 1.20E–11) | U(5.60E–08, 2.40E–07) | U(5.60E–08, 2.40E–07) |
| **Other areas** | | | |
| commercial crops | U(4.00E–12, 2.40E–11) | U(2.80E–08, 4.80E–07) | U(2.80E–08, 4.80E–07) |
| home gardens | U(4.00E–12, 8.00E–12) | U(2.80E–08, 1.60E–07) | U(2.80E–08, 1.60E–07) |
| other plant communities | U(4.00E–12, 8.00E–12) | U(2.80E–08, 1.60E–07) | U(2.80E–08, 1.60E–07) |