Seed Markings of Desi Chickpea

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Seed markings on desi chickpeas were pronounced in 2012 and were observed widely across several states of Australia. Seed markings are defined as dark marks on the seed coat which are not due to diseases such as ascochyta blight, and do not blemish the underlying cotyledons. These seed coat imperfections are undesirable and levels above 2% are considered unattractive. In some cases prices may reflect this.

Types of seed markings

Several different types of seed markings have been observed (Figure 1). The 2013/2014 GTA Trading Standards and the Australian Pulse Standards 2013/14 state that black seeds and mosaic seeds are considered “poor colour” while speckled and tiger striped seeds are not currently considered to be defects.

Slit and speckled seeds are usually faint and go unnoticed. However, in years where markings are prevalent, slit and speckled seeds may be darker or larger and more obvious to the eye.

Tiger striped seeds and blotched seeds are not currently considered “poor colour” unless over 30% of the seed surface is marked on greater than 2% of the seeds (by weight).

Affected crops have been observed containing up to 25% marked seeds (tiger striped and blotched). These markings are visually obvious at such high levels and potentially pose a trading risk.

Incidence

Seed markings can be observed in all of the desi chickpea growing regions of Australia. Some seed markings, like black and mosaic seeds, speckled and slit seeds and tiger striping can occur at very low levels in many environments and years.
In contrast, blotching has occurred less frequently and in localised regions where the environment was conducive. In 2012, certain regions were very badly affected and showed the blotched markings as well as increased levels of other markings such as tiger striped, slits and speckled seeds (Table 1).

What causes seed markings?
Seed markings appear to have a genetic component that can be exacerbated by particular environmental conditions. We believe that:

- *blotching* may be a severe case of tiger striping.
- *blotching* occurs when an environmental condition triggers a physiological response in the plant which exacerbates the severity of markings on the seeds.
- the cause of the physiological response may be a quick onset of heat and/or limited water availability to the plant. Frost is also a possibility.
- markings begin to develop some time during the seed filling stage, but the exact timing of the causative trigger event is not yet known.

Further research is required to improve our understanding of what causes these seed markings and to work out how we might minimise them in the future.

Varietal susceptibility
All current varieties can produce seed with markings (Table 1).

<table>
<thead>
<tr>
<th>Variety</th>
<th>Number of Trials</th>
<th>Tiger stripe (%)</th>
<th>Blotched (%)</th>
<th>Slit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBA Pistol</td>
<td>6</td>
<td>7</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>PBA Hat Trick</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>PBA Boundary</td>
<td>6</td>
<td>1</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Kyabria</td>
<td>6</td>
<td>1</td>
<td>5</td>
<td>24</td>
</tr>
<tr>
<td>Moti</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>21</td>
</tr>
</tbody>
</table>

However, the incidence of seed markings does appear to have a genetic component, although more research is required to understand the true susceptibility of varieties to the various patterns of seed markings.

Effect on dhal quality
Seed markings that occur on the seed coat and that do not penetrate to the cotyledons / kernel have no direct effect on dhal quality.

However, any physiological response of a plant during seed filling has the potential to change the biochemical pathways and deposition of components (such as proteins, starch, etc) as seeds develop and mature. More research is required to determine whether the plants physiological response has changed the chemical composition of the seeds and hence their processing performance or sensory attributes.

Marketing
All seed with blotched, tiger striped, slits and speckled markings were delivered successfully in 2012. The Australian Pulse Standards are subject to review every 3-5 years.

More information


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