Effect of Nitrogen Fertilization on Cranberry Fresh Fruit Keeping Quality

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Effect of Nitrogen Fertilization on Fresh Fruit Keeping Quality

Jean-Pierre Deland, Reza Jalamy, Léon–Étienne Parent and David Bellamy

Photo from Pierre Lambert, Vivaco
Effect of N Fertilization on FF KQ
Protocol

- Fruits were harvested from Laval University experimental plots from a research project on cranberry fertilization.
- The treatments of interest for this trial were those fertilized with 0, 13, 27, 40 and 54 lbs N/acre (0, 15, 30, 45 and 60 kg N/ha). They received these amounts of nitrogen for the last three years.
- Each treatment was replicated twice on each of 3 conventional sites (Laurierville, Notre-Dame-de-Lourdes) and 1 organic site (Saint-Louis-de-Blandford)
The nitrogen sources were ammonium sulfate (21-0-0) for the conventional sites and amino acid solutions in the organic farm (8-0-0 in 2015 and 6-1-1 in 2016).

Each of these plots also received 30 lbs $P_2O_5$/acre, 85 lbs $K_2O$/acre, 10 lbs of Mg/acre, 1.8 lbs Cu/acre and 0.9 lbs B/acre every year.

Seven to eight-pound fruit samples were harvested with a hand rake from each plot between October 8th and 12th.
Effect of N Fertilization on FF KQ Protocol

- Five pounds of fruits from each sample were put in a cardboard box and kept at regular storage temperature (6°C) for a period of 12 weeks.

- At harvest, and after 3, 6, 9 and 12 weeks, the fruit quality was evaluated. The defective fruits were classified as bruised, scarred, soft or decayed, injured by insects and undersized, were then counted and weighed.
Effect of N Fertilization on FF KQ

Results KQ Conventional

Cumulative percentage defects

0 5 10 15 20 25


0 N 13 N 27 N 40 N 53 N

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Results KQ Organic

Cumulative percentage defects

- 0 N
- 13 N
- 27 N
- 40 N
- 53 N

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Effect of N Fertilization on FF KQ
Results Fruit Rot Conventional

Cumulative percentage fruit rot

0 N
13 N
27 N
40 N
53 N

(34)
(35)
(37)
(41)
(43)
Effect of N Fertilization on FF KQ
Results Fruit Rot Organic

Cumulative percentage fruitrots
0 10-15 10-21 10-28 11-04 11-11 11-18 11-25 12-2 12-9 12-16 12-23 12-30 01-06

0 N 13 N 27 N 40 N 53 N

(25) (30) (38) (45) (48)
Effect of N Fertilization on FF KQ

Results Insect Damage Organic

<table>
<thead>
<tr>
<th>Amount of nitrogen applied annually (lbs/acre)</th>
<th>Percent fruit damaged by insects</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>13</td>
<td>3.00</td>
</tr>
<tr>
<td>27</td>
<td>4.00</td>
</tr>
<tr>
<td>40</td>
<td>5.00</td>
</tr>
<tr>
<td>54</td>
<td>5.00</td>
</tr>
</tbody>
</table>
Effect of N Fertilization on FF KQ

Results Fruit color
Effect of N Fertilization on FF KQ

Results Fruit color

\[ P < 0.001, R^2 = 0.63 \]

- Amount of nitrogen applied annually (lbs/acre)
Effect of N Fertilization on FF KQ

Results yield

Conventional sites

Organic site

Amount of nitrogen applied annually (lbs/acre)

Data from Reza Jalami
Effect of N Fertilization on FF KQ

Conclusion

• Nitrogen fertilization had an effect on fresh fruit keeping quality. As nitrogen fertilization increased, the keeping quality decreased.

• The main factor explaining the effect on keeping quality is fruit rot. As nitrogen fertilization increased, fruit rot increased.

• Nitrogen fertilization had an effect on fruit color uniformity and TAcy. As the nitrogen fertilization increased, the fruit color uniformity and TAcy decreased.
Effect of N Fertilization on FF KQ

Conclusion

• Nitrogen fertilization had an effect on yield. The increase in the nitrogen fertilization usually resulted in an increase in yield, with the biggest increase occurring up to a fertilization of 27 lbs of nitrogen/acre.

• Based on this project, considering the effect on quality and on yield of nitrogen fertilization of fresh fruits, an annual fertilization of 27 to 40 lbs of nitrogen/acre should be recommended on sandy soil in Quebec.