

The effects of nitrogen fertilization on metabolites in *Vaccinium corymbosum* flower pollen

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Introduction

In this study we investigated the effect of nitrogen (N) fertilization on the metabolites of blueberry flowers produced in pollen. As honeybees feed on pollen and nectar, understanding whether N fertilization affects metabolite content is of relevance for their nutrition.

- Five classes of metabolites were included in the data: carbohydrates, amino acids, metabolites of shikimate pathway and trioxycylic acid cycle (TCA), and vitamins and antioxidants (categorized as others).

Methods

1. Pollen was collected from blueberry plants grown in the experimental fields of Washington University and fertilized as follows: [N] low (33-38 kg/ha), medium (67-72 kg/ha), and high (101-106 kg/ha)
2. Metabolites were extracted and derivatized using standard protocol and separated via GC-MS
3. Metabolites were annotated and quantified by comparison with metabolite libraries and internal standards

Results

Nitrogen fertilization in soil greatly affects metabolite content in pollen. In particular, we observed the following trends:

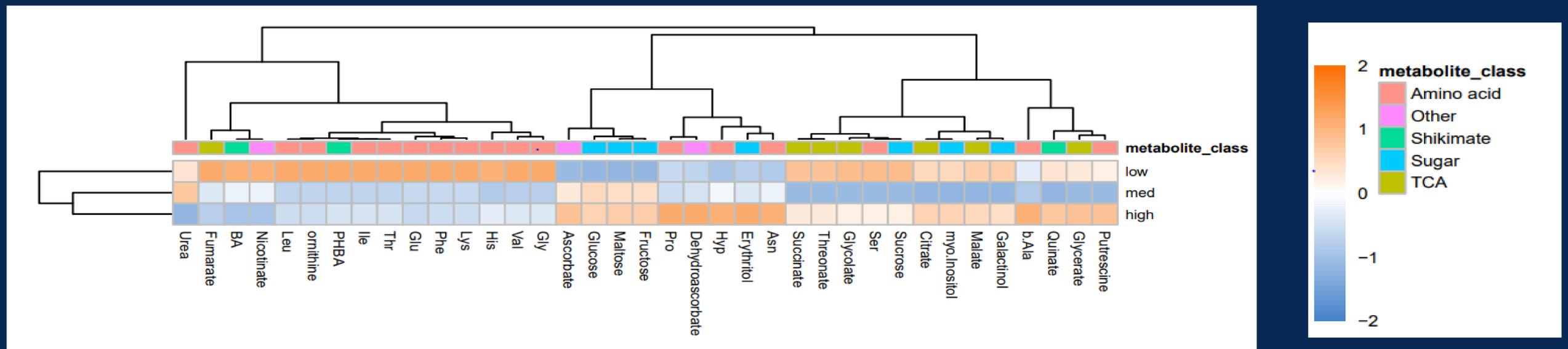
- Sugars are more abundant in the treatment with high N
- Intermediates of TCA are present in both high and low treatments, but not medium
- Amino acids are highly abundant in the low treatment

Conclusions

The data shows that with a change in concentration of N fertilization there is a variation in metabolite expression.

- A low nitrogen treatment produces more amino acids
- These counterintuitive results may be due to the increased focus in pollen production to salvage the plants reproduction even with low N soil concentration

Figure 1 – Heat Map with Metabolite Classes and Nitrogen Concentrations



Each fertilization concentration (low, med, high) shows a different class of metabolites being expressed