



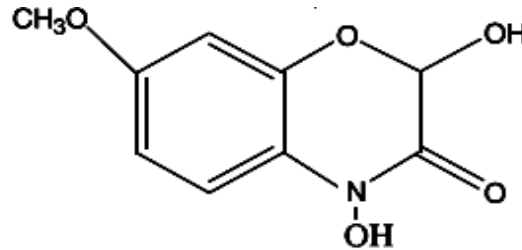
Chemical Ecology Program

Rothamsted Research



BBSRC, HGCA, BWB.

**HYDROXAMIC ACIDS
(benzoxazinones)**



**insects (chewing
and sucking) and
air born pathogens**

DIMBOA

**APHIDS, artificial
diets**

**fungi, bacteria and
nematodes**

**Allelopathy
weeds**



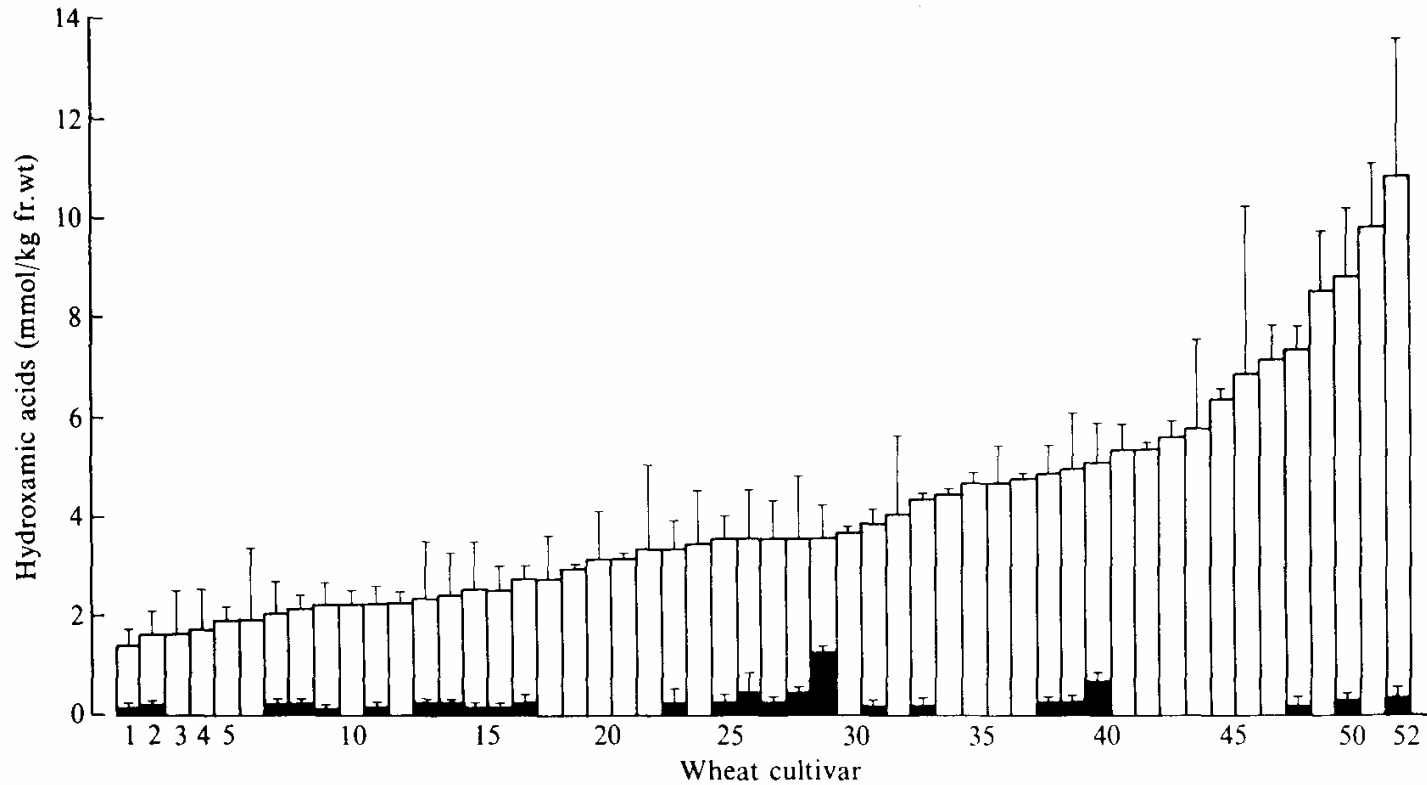
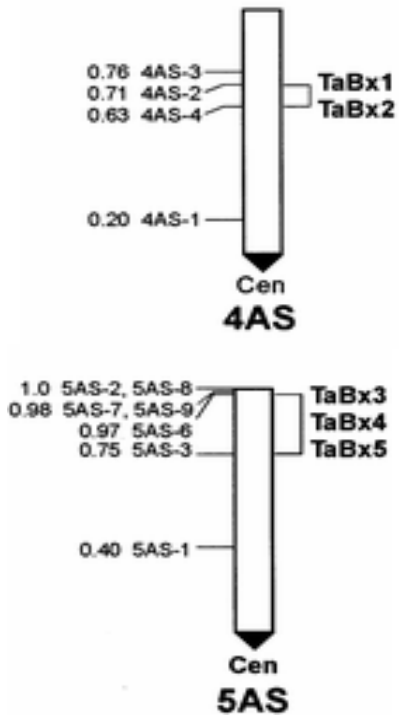


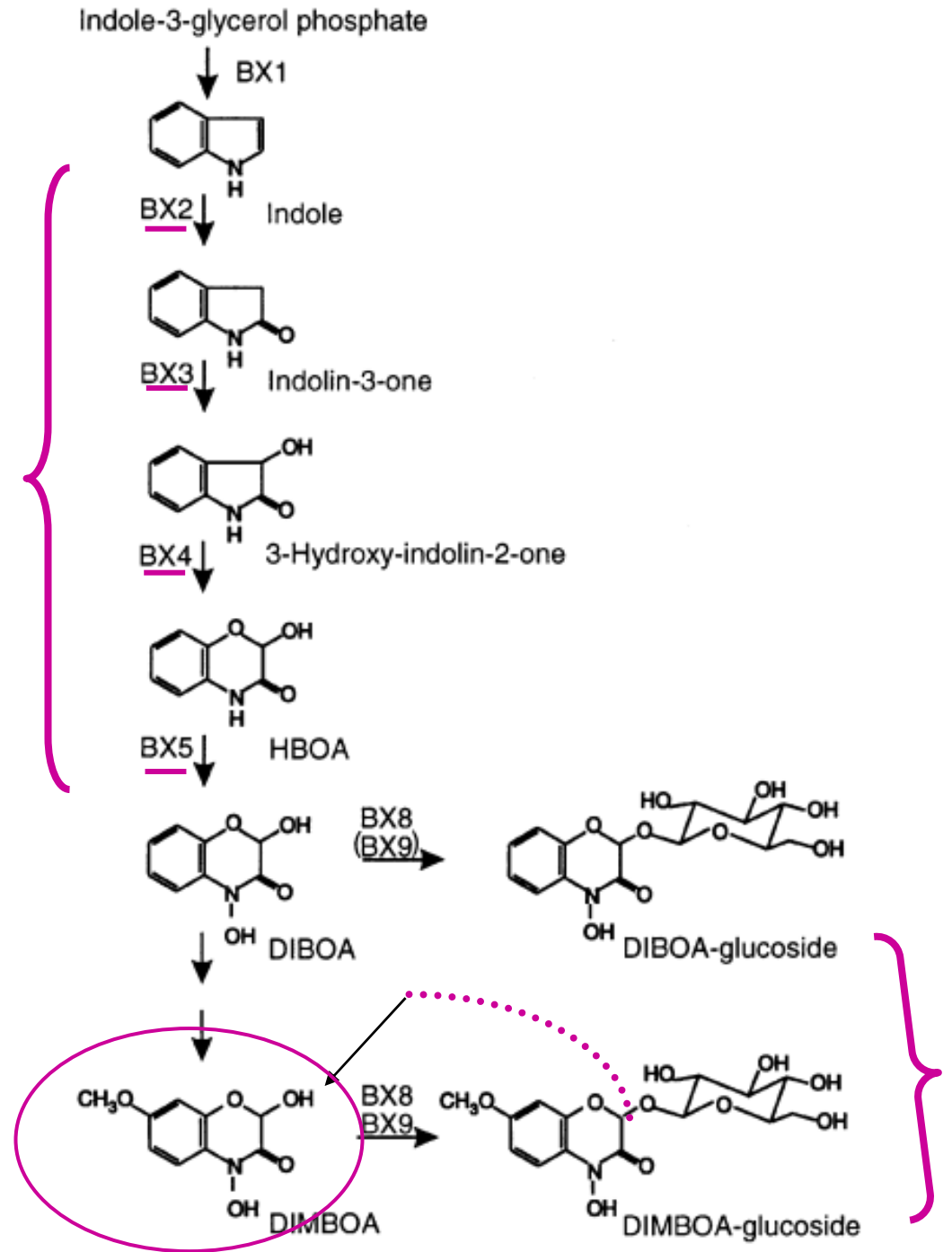
Fig. 2. Maximum DIBOA (■) and DIMBOA (□) levels in seedlings of Chilean wheat cultivars: 1 (Perquenco), 2 (Vilufén), 3 (Antufén), 4 (Andalién), 5 (Talhuén), 6 (Lilén), 7 (Nobo), 8 (Huenufén), 9 (Canelo), 10 (Reihue), 11 (Lancero), 12 (Ancoa), 13 (Pumafén), 14 (Maitén), 15 (Chifén), 16 (Talaforén), 17 (Rancoforén), 18 (Laurel), 19 (T-1500), 20 (Aurifén), 21 (Malifén), 22 (Yafén), 23 (Budifén), 24 (Mexifén), 25 (Lautaro), 26 (Collafén), 27 (Cunco), 28 (Patagua), 29 (Labriego), 30 (Etoile de Choisy), 31 (Millaleu), 32 (Linaza), 33 (Manella), 34 (Likafén), 35 (Manqueforén), 36 (Vilmorin), 37 (Cisne), 38 (Toquifén), 39 (Chasqui), 40 (Lanco), 41, (Panguifén), 42 (Lilifén), 43 (Lancoforén), 44 (Sonka-INIA), 45 (Andifén), 46 (Trisa), 47 (SNA-3), 48 (Naofén), 49 (Likay), 50 (Sipa), 51 (Alifén) and 52 (Quilafén). All cultivars were *T. aestivum*, except for 47 and 52, which were *T. durum*. Bars represent the upper 95% confidence limit.



Cytochrome P450s

Chromosome localisation in wheat

Glu A, B and C



DIMBOA biosynthetic and activating gene expression in detail in the variety “Welford” in relation

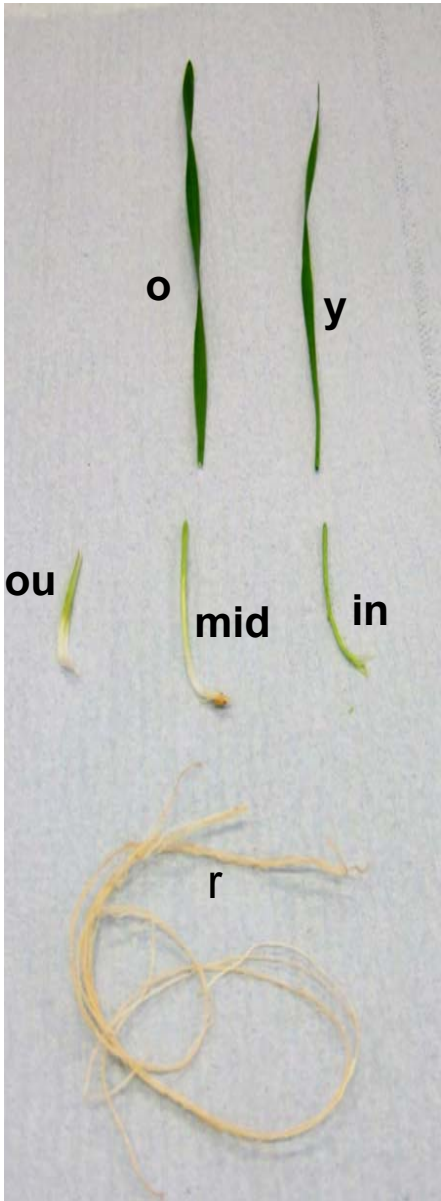
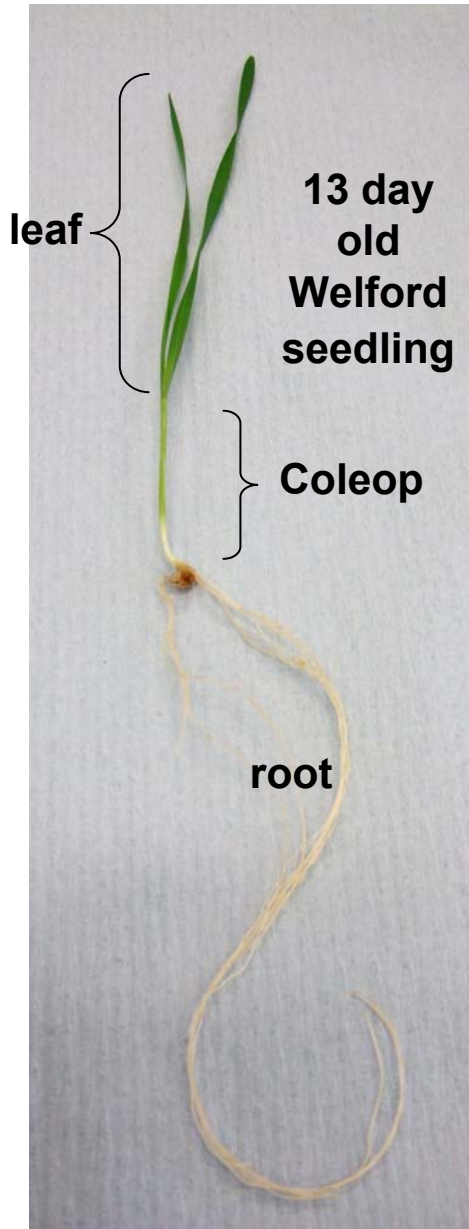
- **to hydroxamic content (HPLC, GC MS and NMR)**
- **aphid (other pathogen) resistance**

Use information to develop screen to identify suitable varieties to incorporate into a breeding program to generate aphid resistance in wheat

- **levels of expression in different tissues**
- **over time during early development**
- **in response to a natural defence activator**

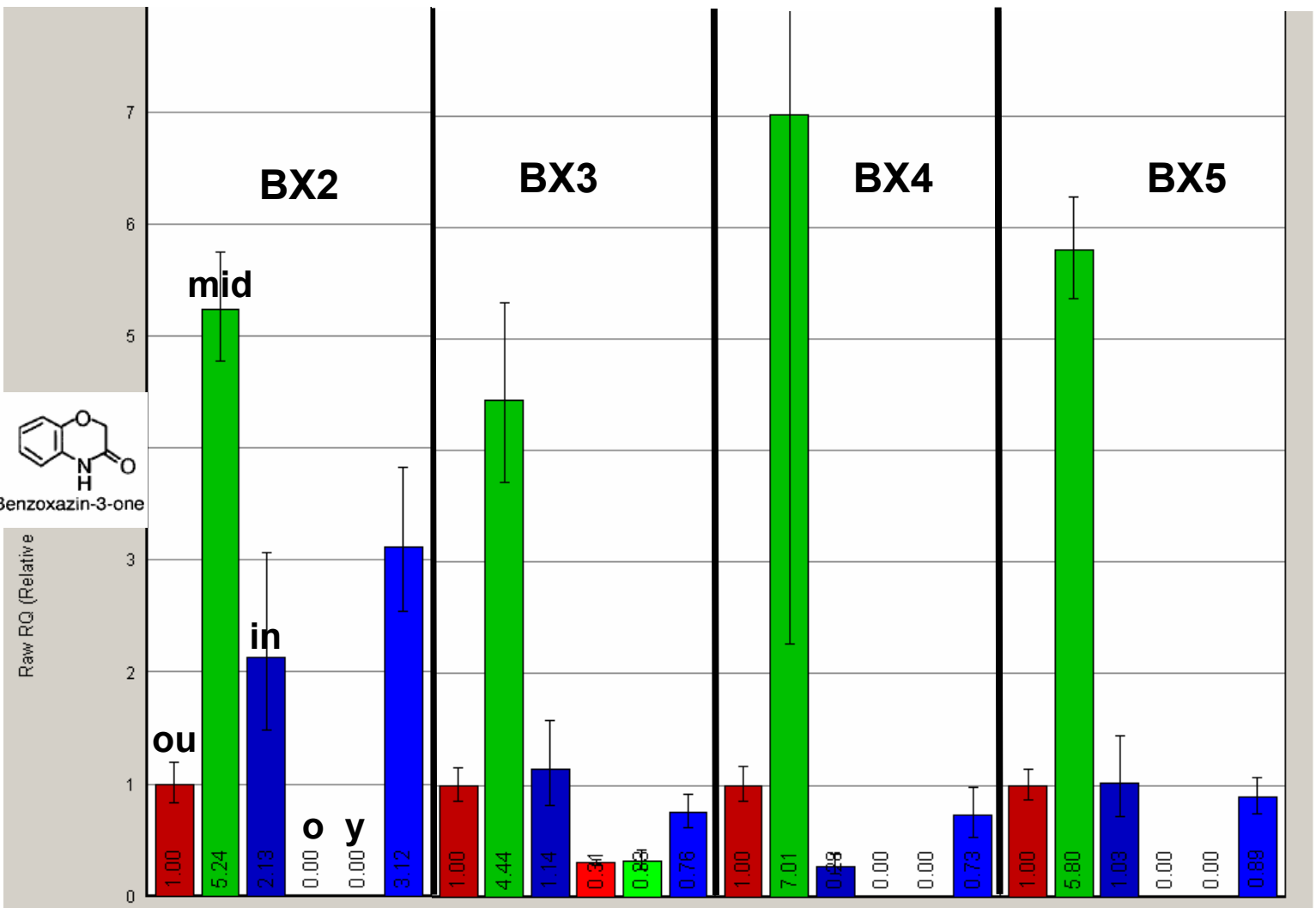
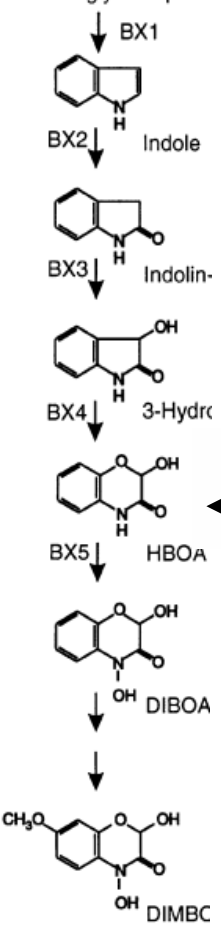
cis-jasmone

- **induce resistance to aphids in field trials**
- **effects a small number of defence genes**
- **no growth detriment**



Tissue regulation

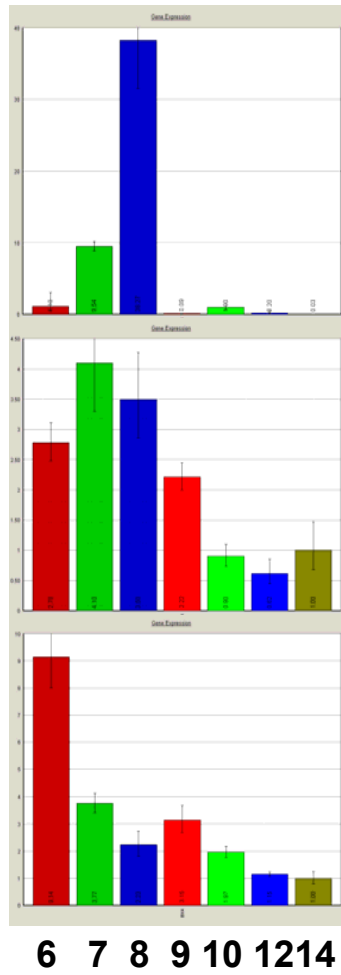
Indole-3-glycerol phos



DIMBOA $\mu\text{g/g}$ FW
 coleop 124
 Leaf 519
 Root 9.4

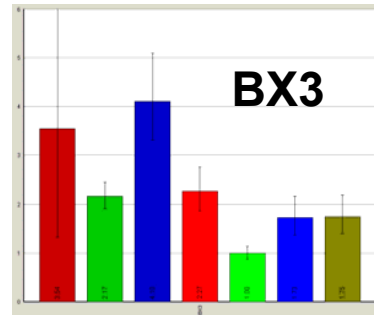
**Glucosidases more in root
 and leaf than BXs**

BX4



Days post germination

Leaf

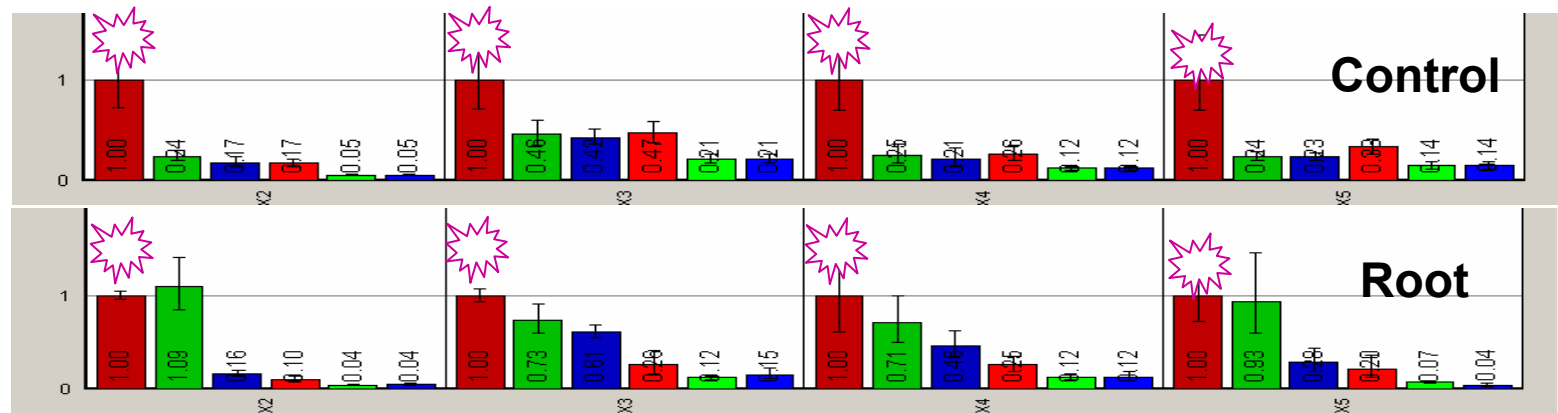
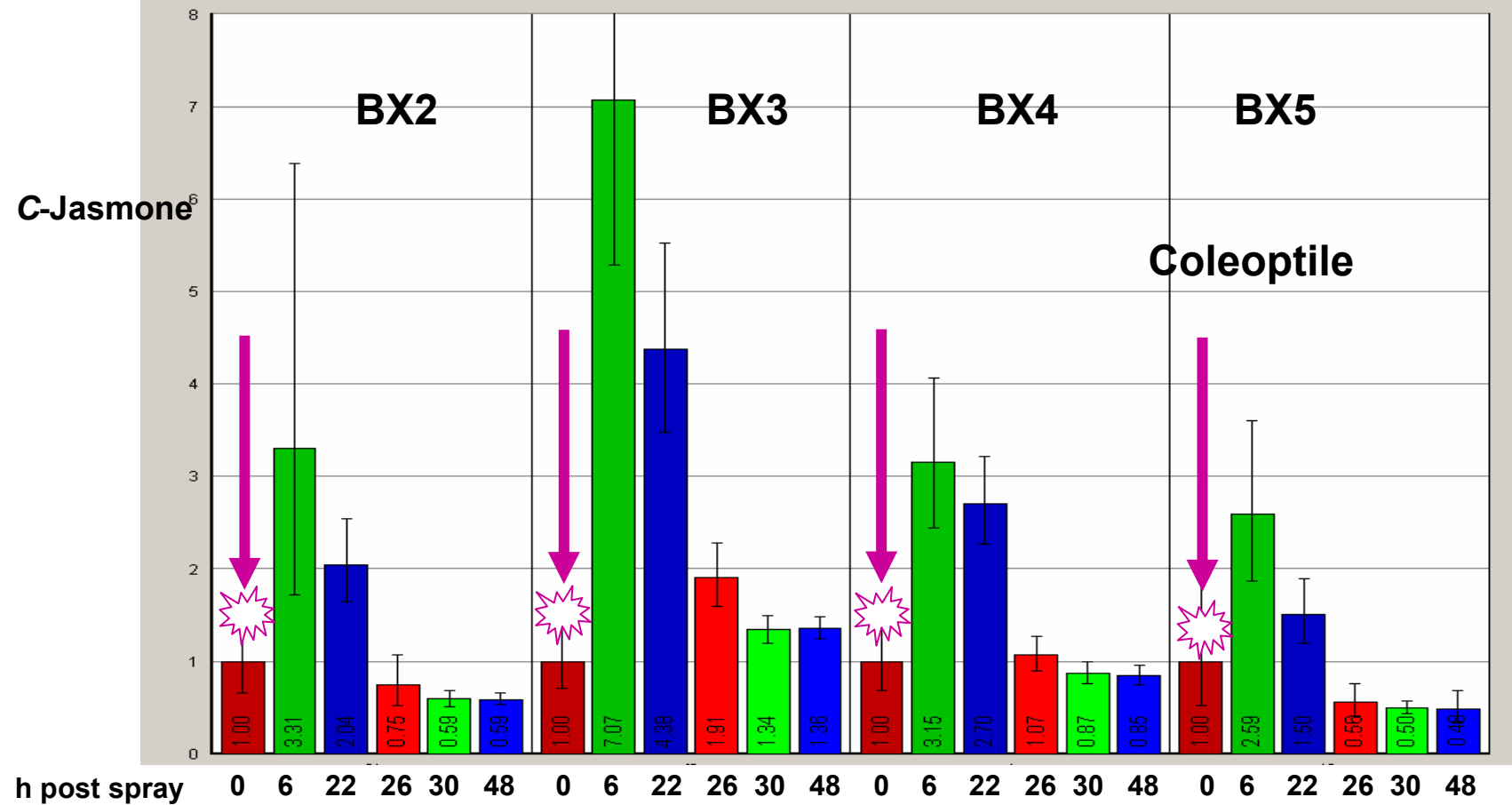


BX3

Coleoptile

Change in BX gene expression during development in different plant tissues.

Root



Summary

- DIMBOA biosynthetic and activating genes are expressed mostly in the coleoptile
- The compound accumulates in the leaf suggesting transport
- Expression decreases during the first 14 days post germination (except for one gene)
- Both sets of genes are induced by *cis*-jasmone, but not in the same tissues

This information will now be related to the presence of the different forms of DIMBOA and to aphid resistance in a range of varieties to inform a breeding program



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