

Assessment of vitamin C and anthocyanin content of lettuce germplasm (*Lactuca* spp.)

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Plant Science & Research

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Aurora Díaz

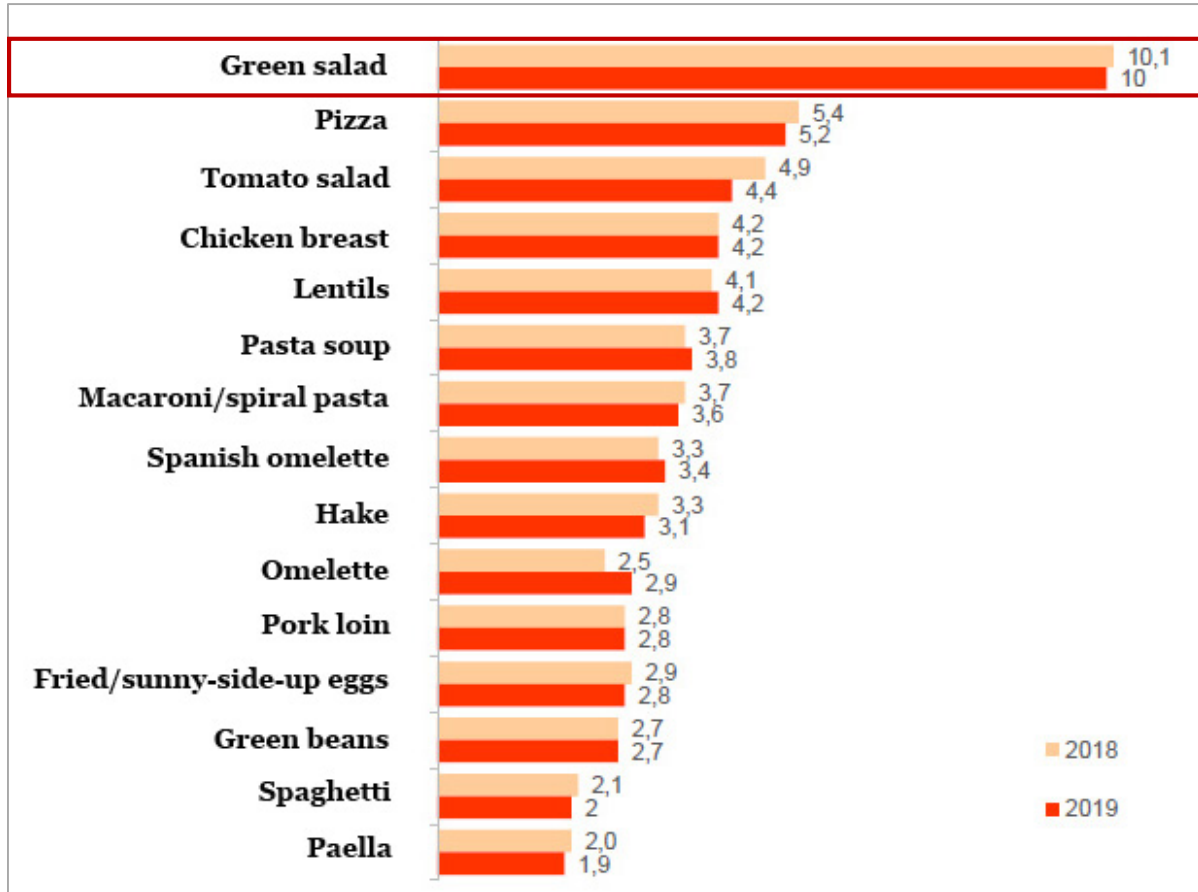
Juan Ramón Bertolín

Inés Medina-Lozano

Lettuce is the most consumed leafy vegetable worldwide ...

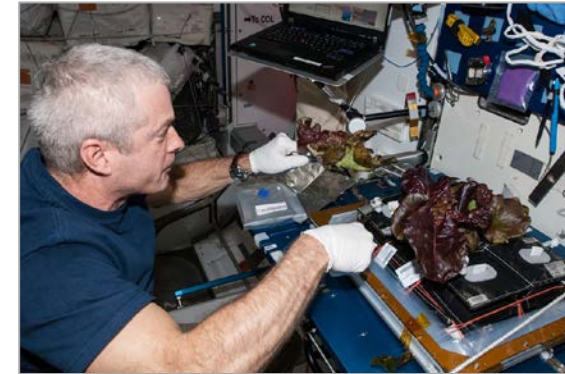
... and one of the 1st vegetables grown in space

Ranking of meals in Spanish homes



Source: Spanish Ministry of Agriculture, Fisheries and Food (2019)

The astronaut Steve Swanson harvesting lettuce plants aboard the International Space Station in 2014

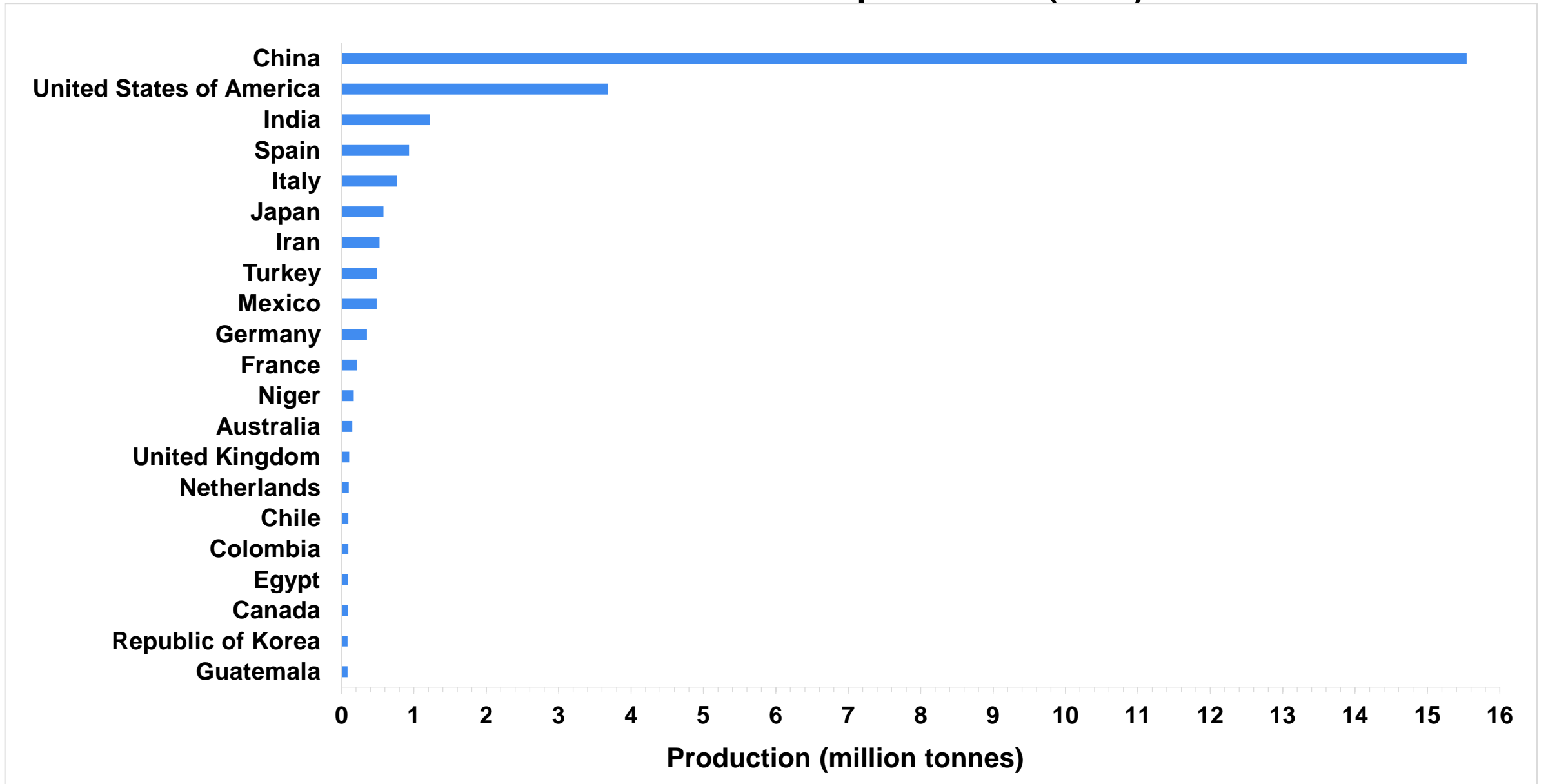


Red romaine lettuce in 2016 ready to be harvested and returned to Earth for testing

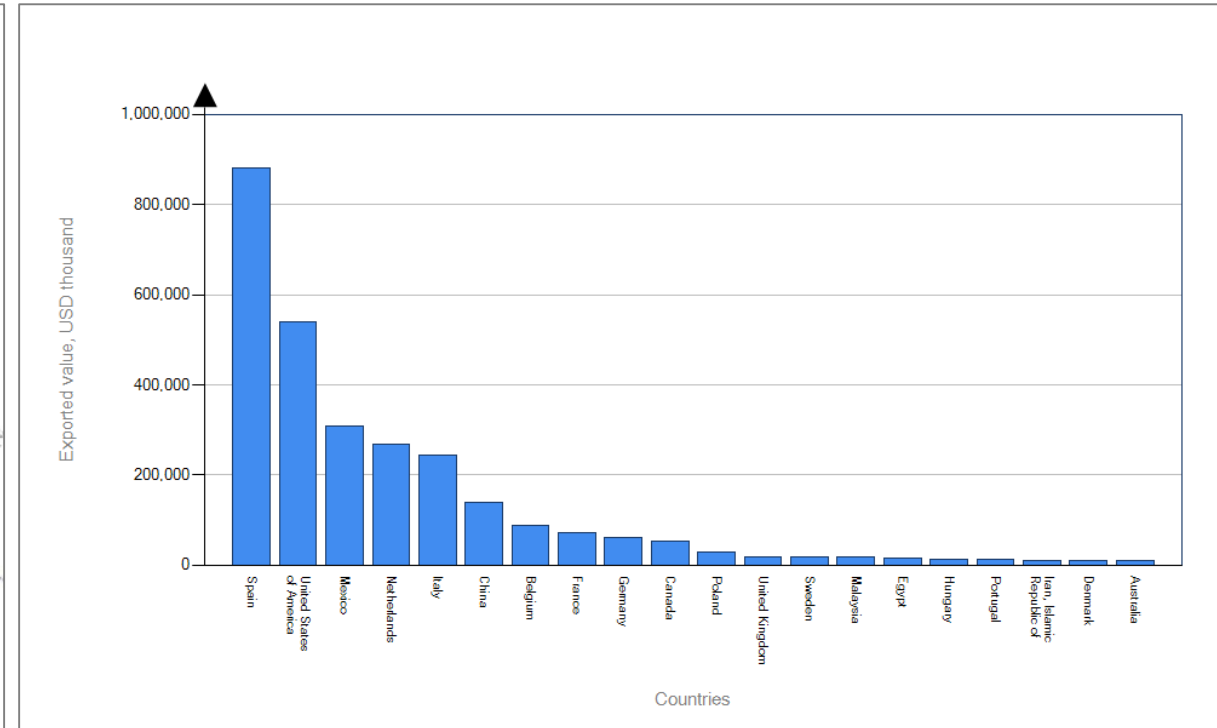
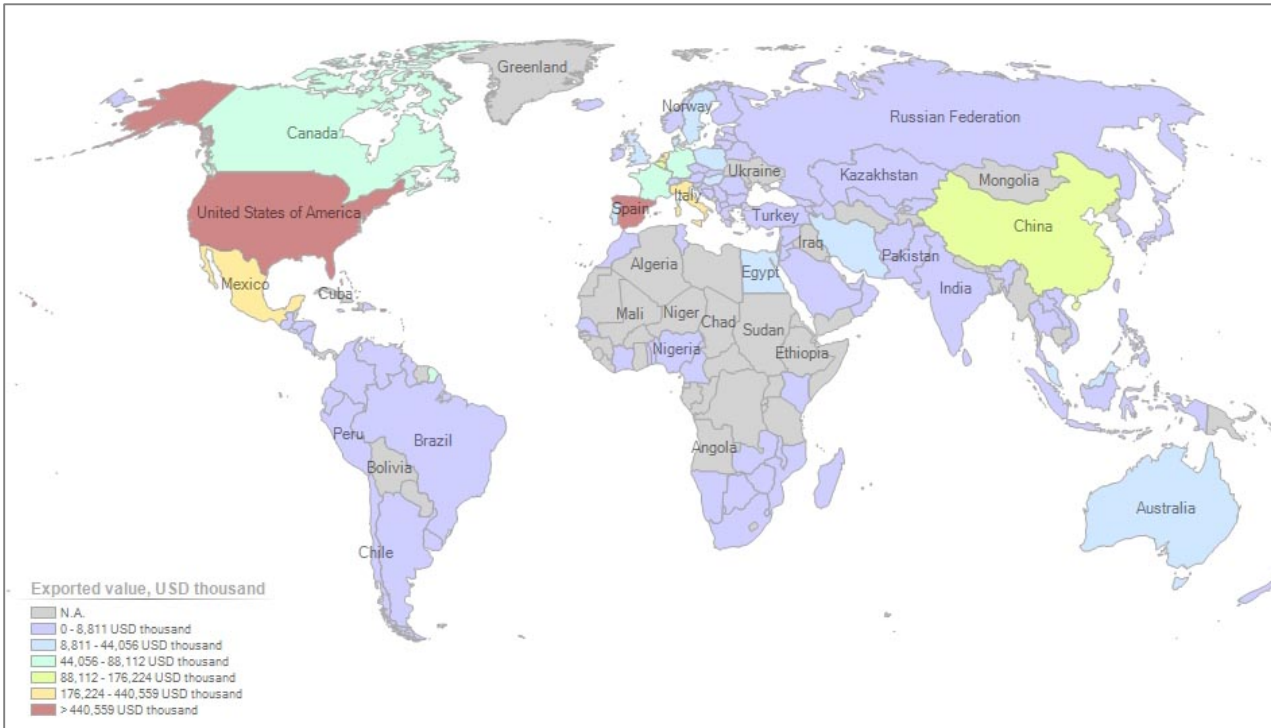


Source: JSC/NASA

World lettuce and endive production (2018)



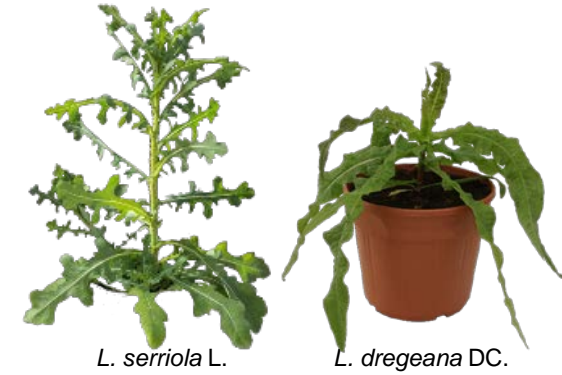
Lettuce and endive exporting countries and exported value (2019)



Sources: ITC calculations based on UN COMTRADE and ITC statistics.

Assessment of vitamin C and anthocyanin content of lettuce germplasm (*Lactuca* spp.)

✓ ↑ quality (↑ vitamin C)



L. serriola L.

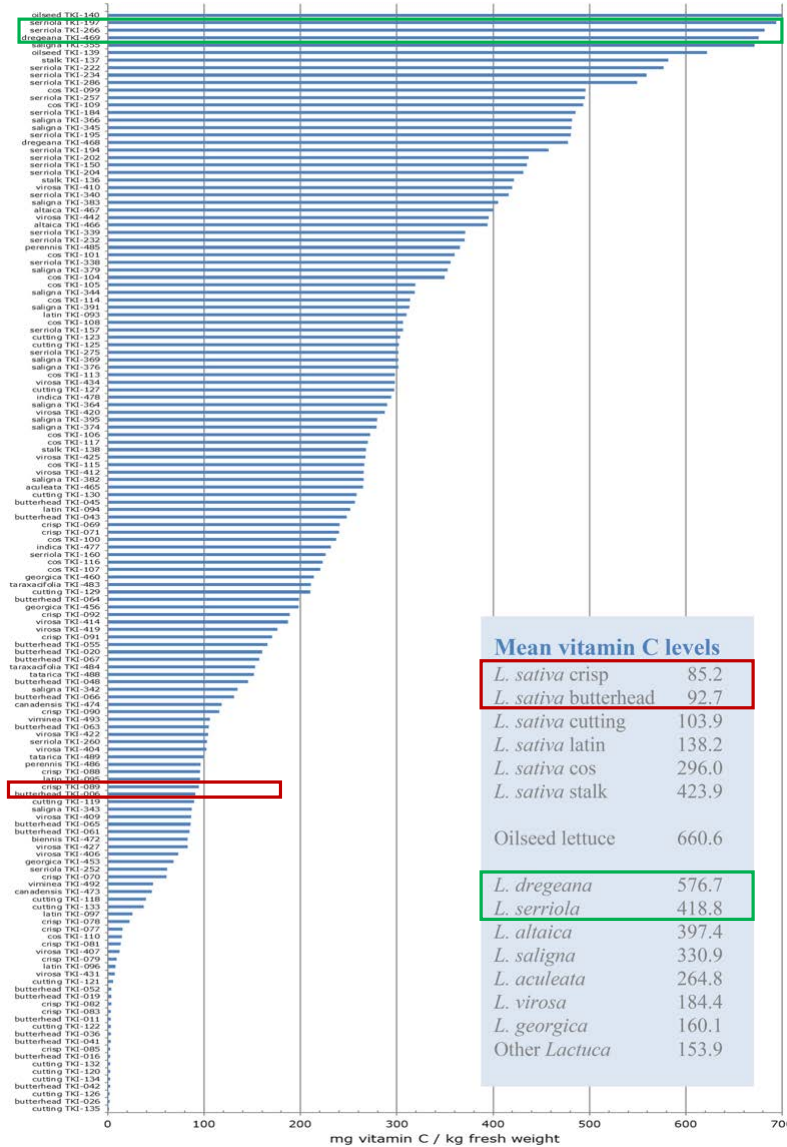
L. dregeana DC.



Butterhead



Iceberg



Mean vitamin C levels	
<i>L. sativa</i> crisp	85.2
<i>L. sativa</i> butterhead	92.7
<i>L. sativa</i> cutting	103.9
<i>L. sativa</i> latin	138.2
<i>L. sativa</i> cos	296.0
<i>L. sativa</i> stalk	423.9
Oilseed lettuce	660.6
<i>L. dregeana</i>	576.7
<i>L. serriola</i>	418.8
<i>L. altaica</i>	397.4
<i>L. saligna</i>	330.9
<i>L. aculeata</i>	264.8
<i>L. virosa</i>	184.4
<i>L. georgica</i>	160.1
Other <i>Lactuca</i>	153.9

Assessment of vitamin C and anthocyanin content of lettuce germplasm (*Lactuca* spp.)

Commercial varieties of green lettuce



'Begoña'



'Dolomiti G12'



'Romana Inverna'



'Winter Crop'

Commercial varieties of red lettuce



'Likarix'



'Lollo Rosso'



'Nestorix'



'Red Sails'



'Revolution'



'Romired'

Traditional varieties of green lettuce



'Lechuga de Becelte'



'Lechuga de Ensalada'



'Lechuga de Híjar'



'Lechuga de Subías'



'Lechuga del Pirineo'



'Lechuga del Valle de Tena'



'Lechuga Romana Zaragozana'



'Lengua de Buey'



'Oreja de Mulo'

Traditional varieties of semi-red lettuce



'Lechuga de Bureta'



'Morada de Belchite'



'Morada de Bernués'



'Morada de Sorripas'

Wild lettuce relatives (*Lactuca* spp.)



L. biennis
(Moench) Fernald



L. dentata
Makino



L. dregeana DC.



L. floridana
L. Gaertn.



L. homblei
De Wild

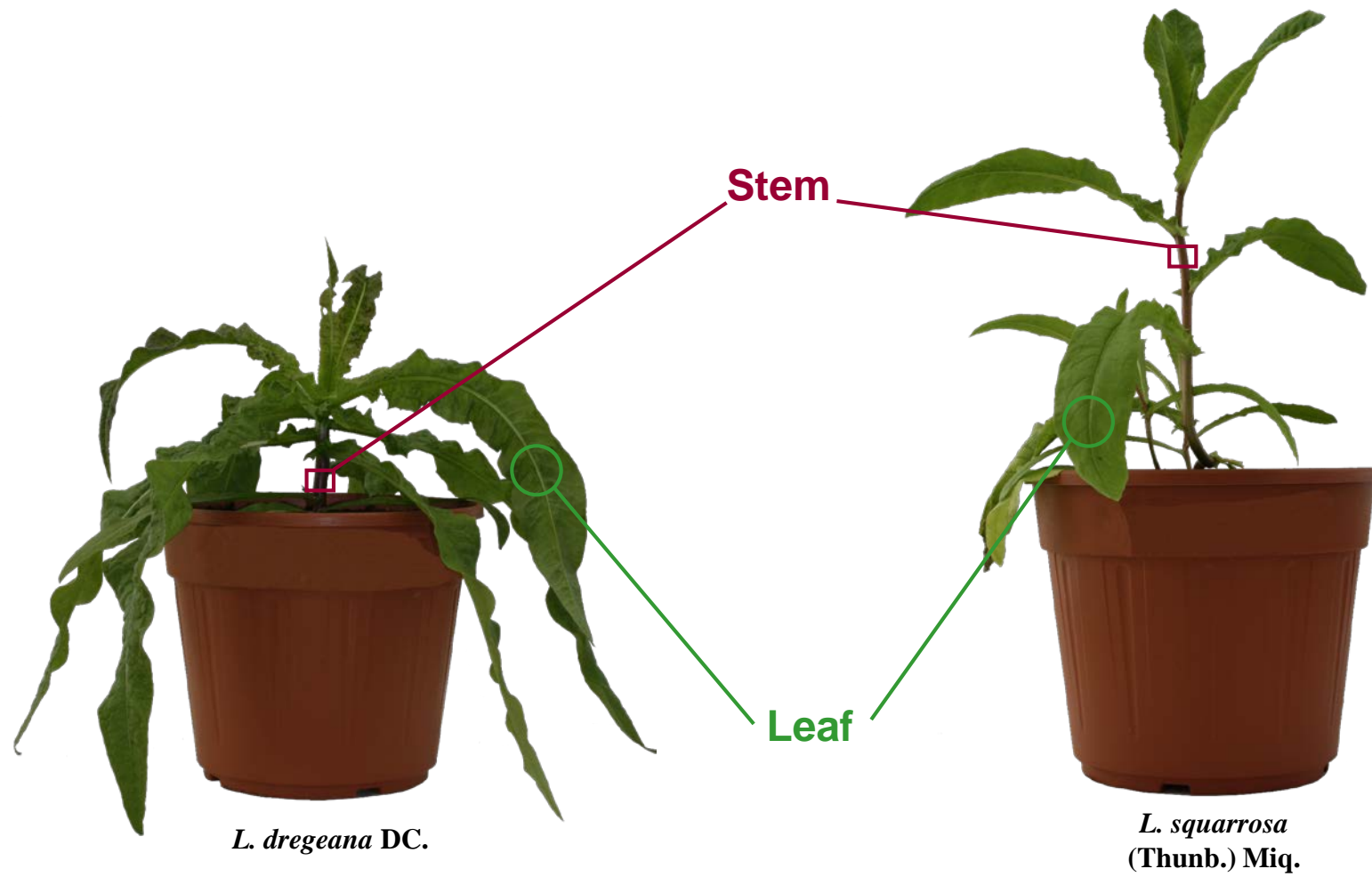


L. squarrosa
(Thunb.) Miq.



L. virosa L.

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L. dregeana DC.

L. squarrosa
(Thunb.) Miq.

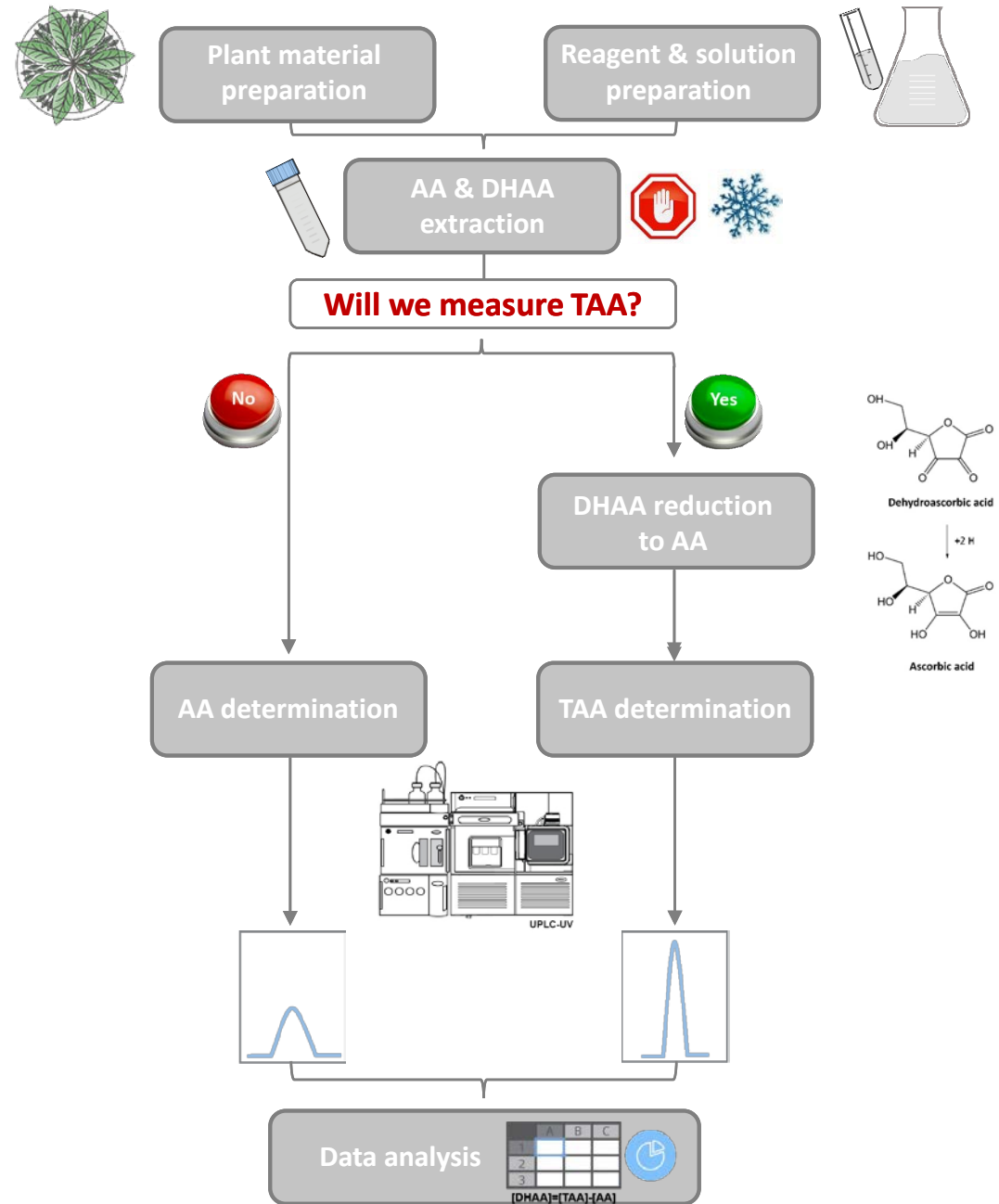
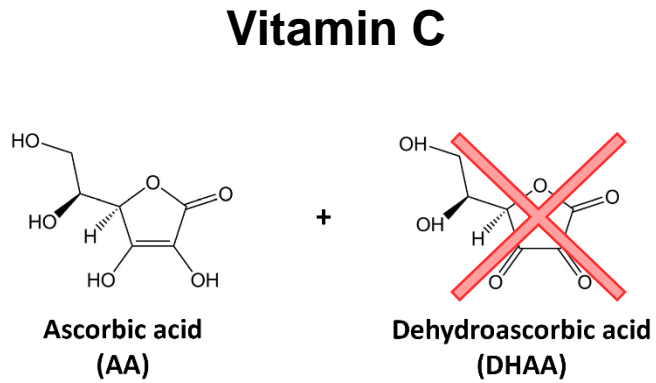


L. dregeana DC.

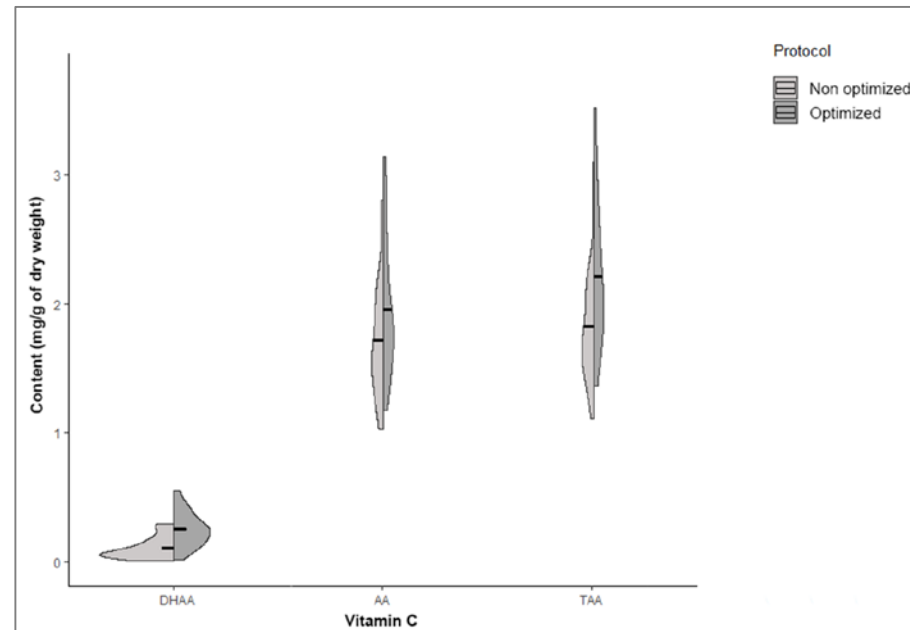
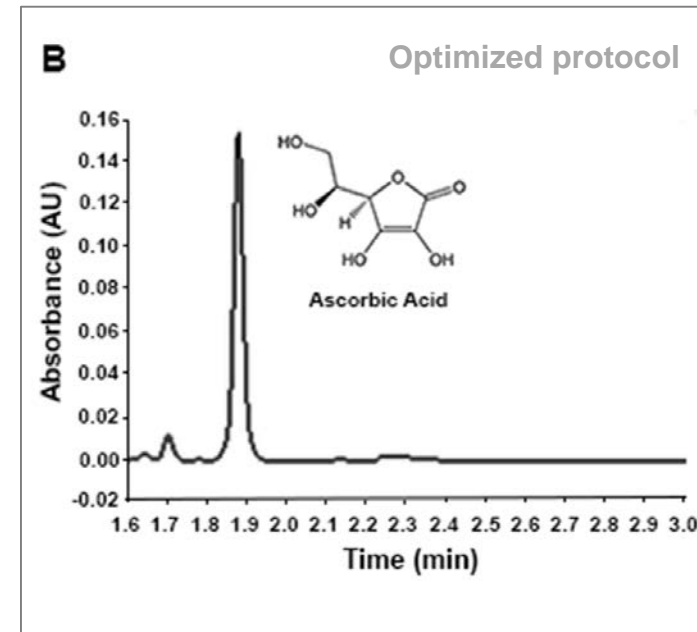
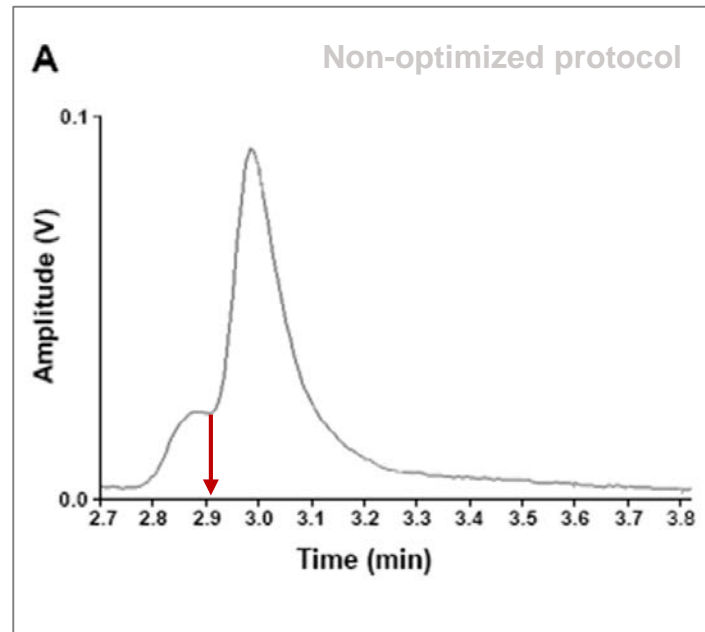


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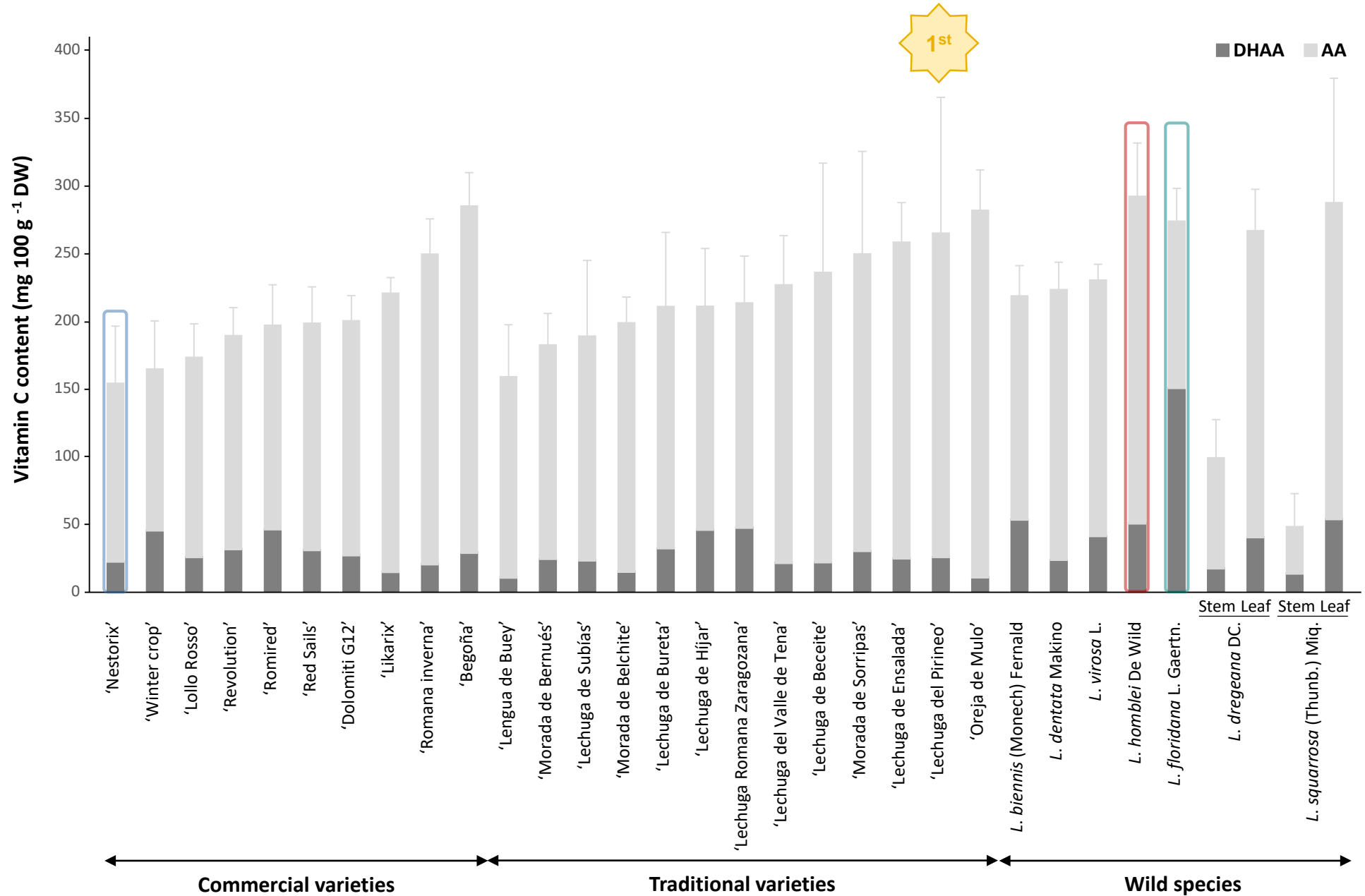


Vitamin C



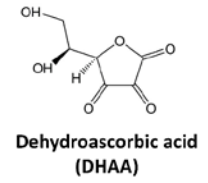
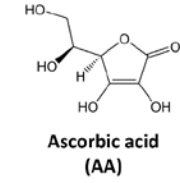
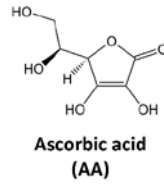
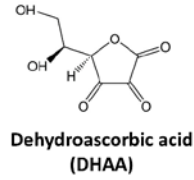
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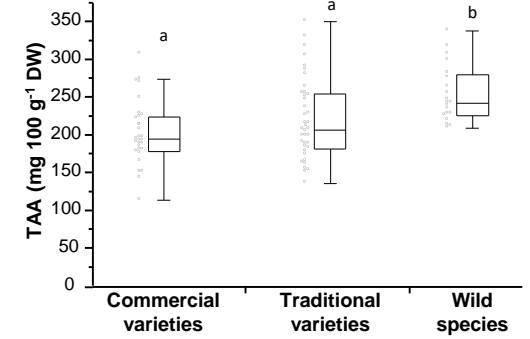
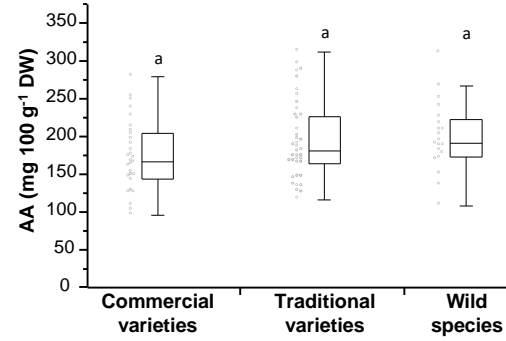
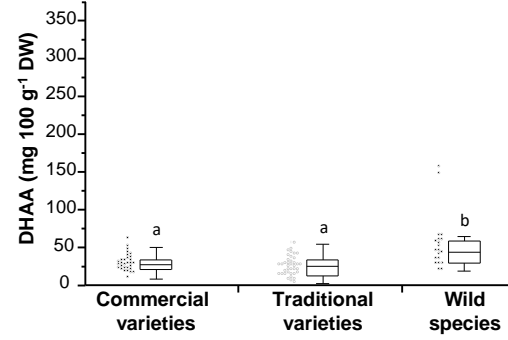


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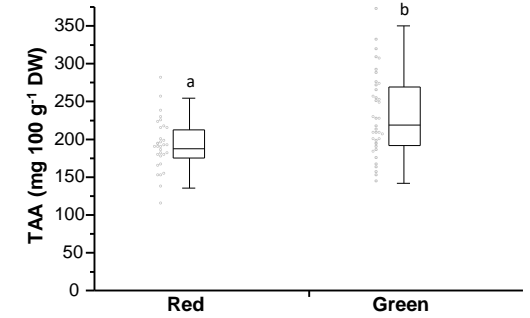
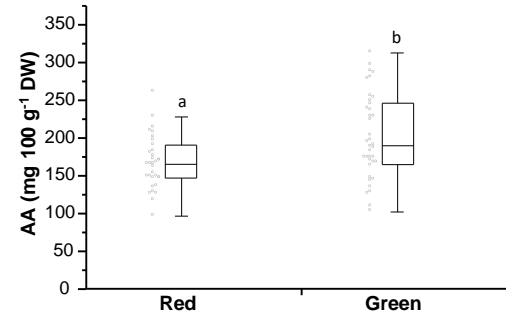
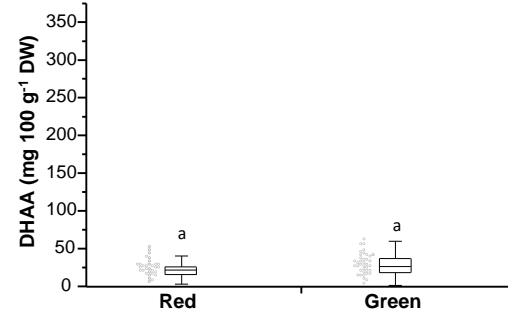
Vitamin C



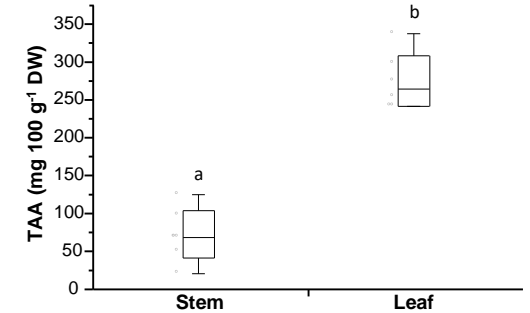
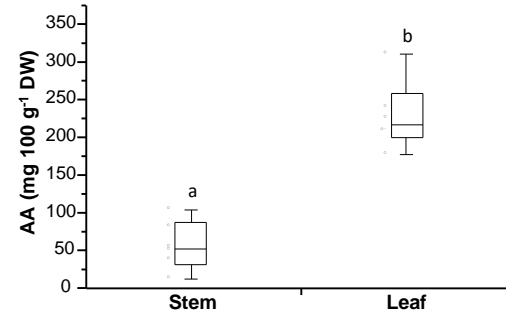
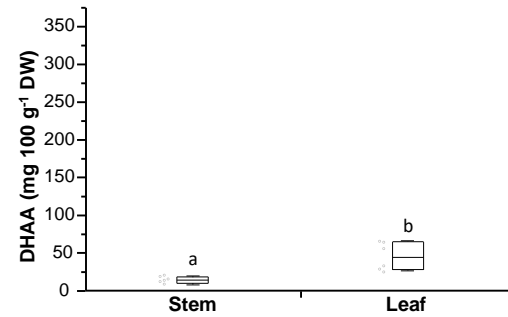
Type of accession



Leaf colour

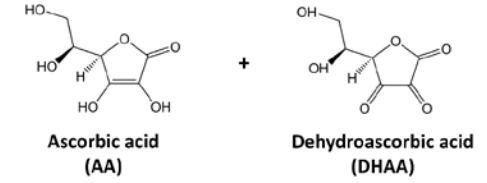
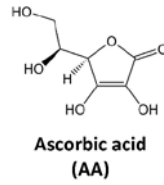
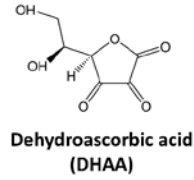


Tissue



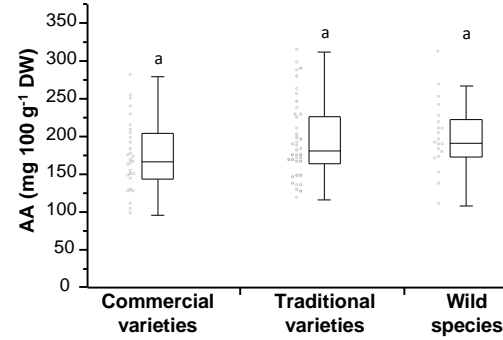
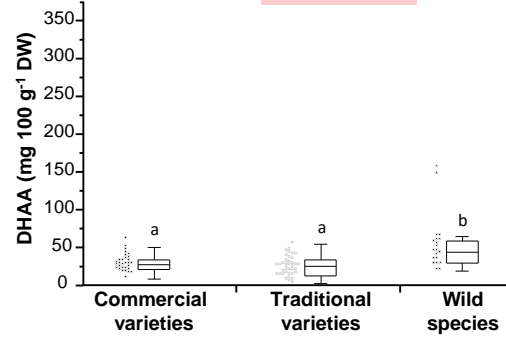
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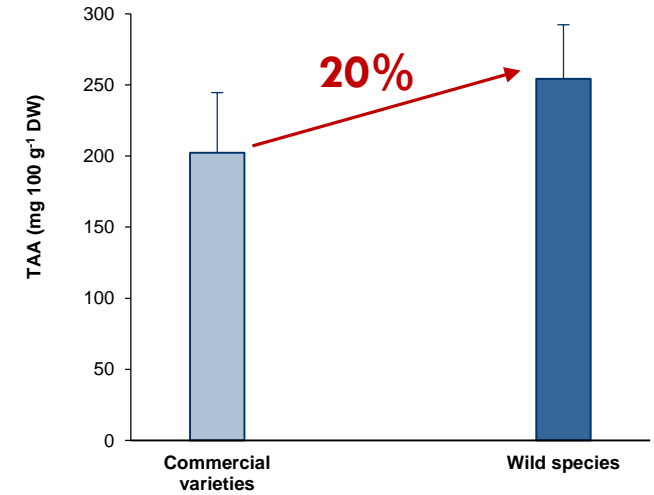
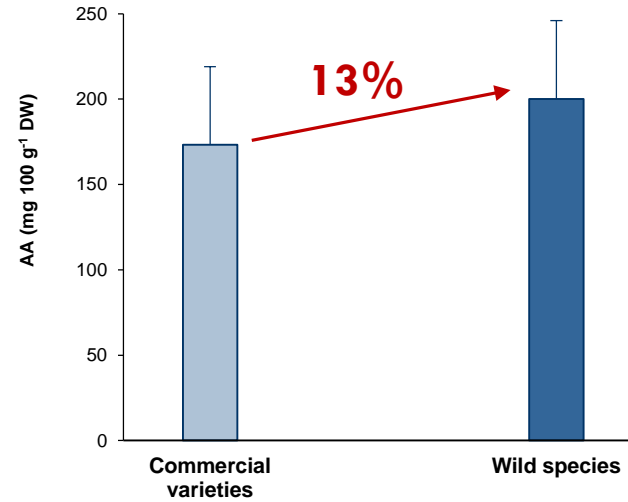
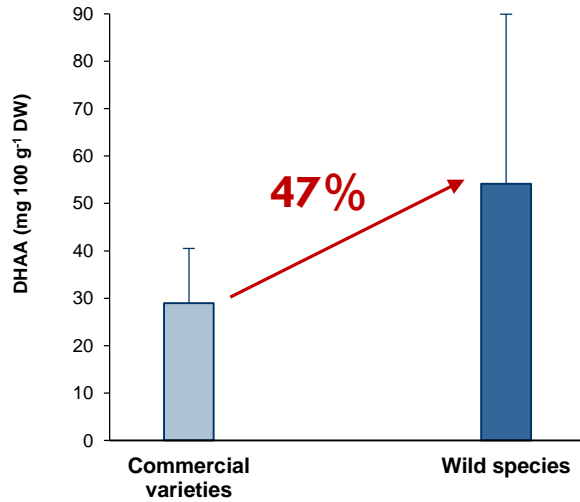
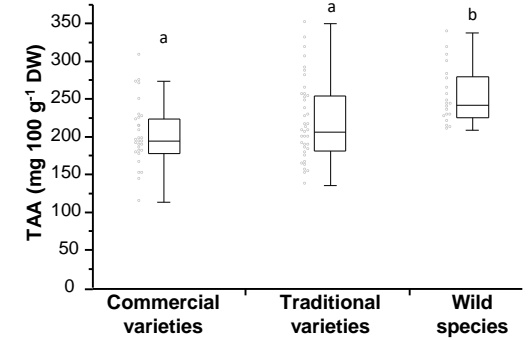


Type of accession

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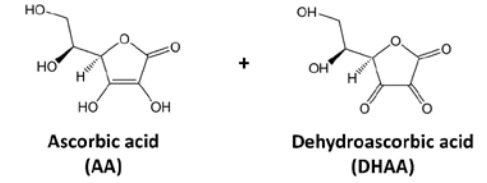
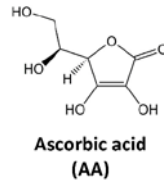
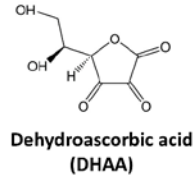


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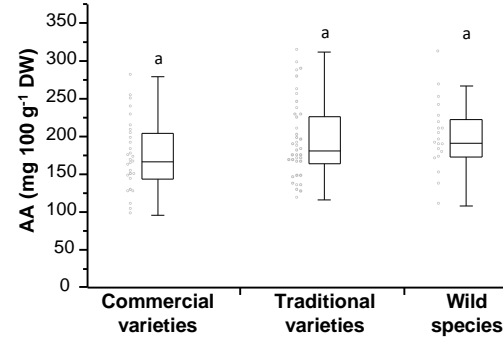
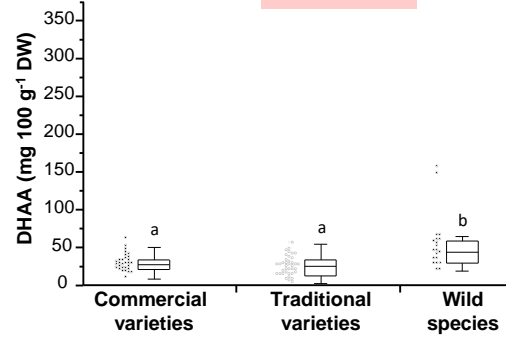
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Vitamin C

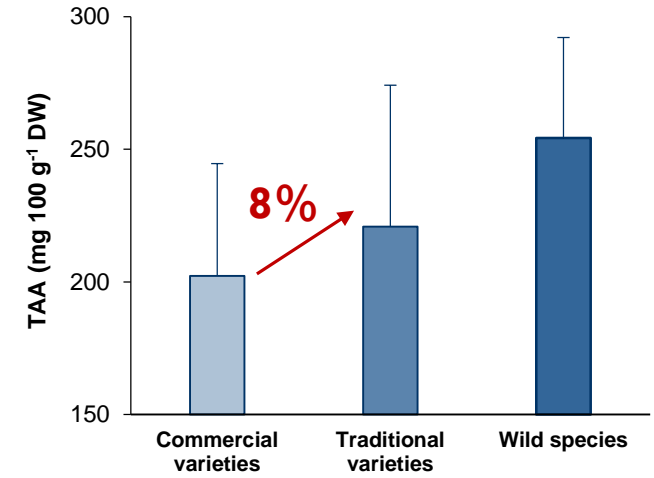
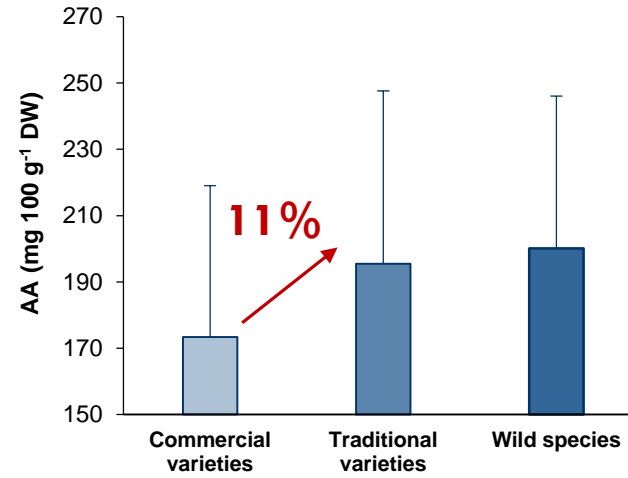
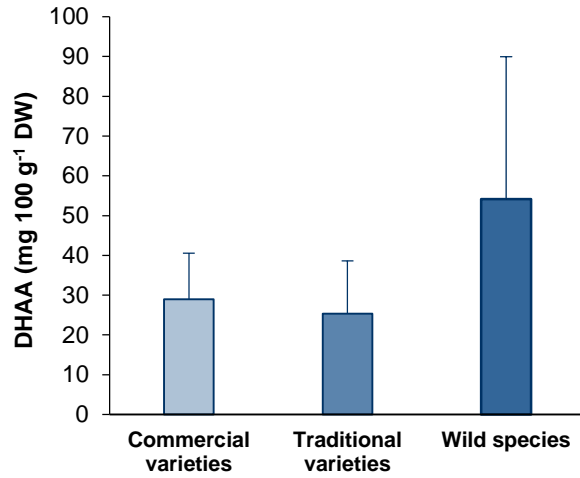
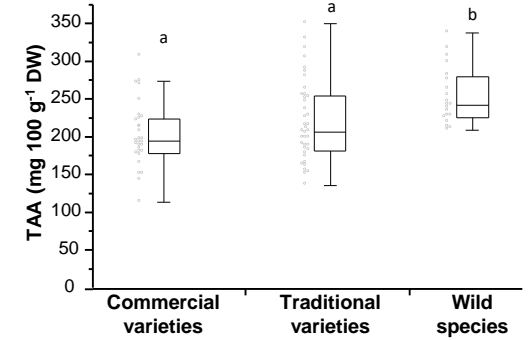


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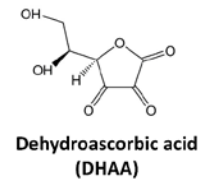
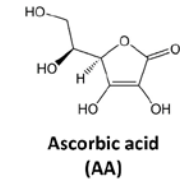
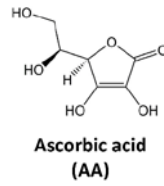
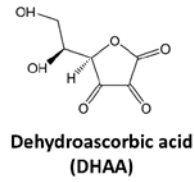


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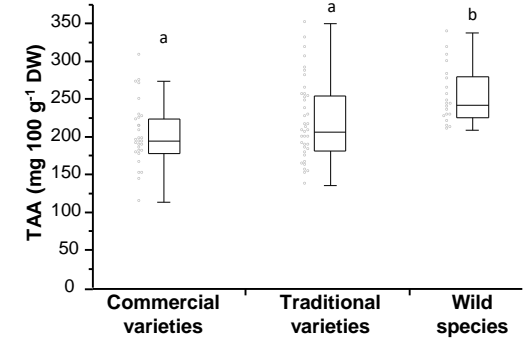
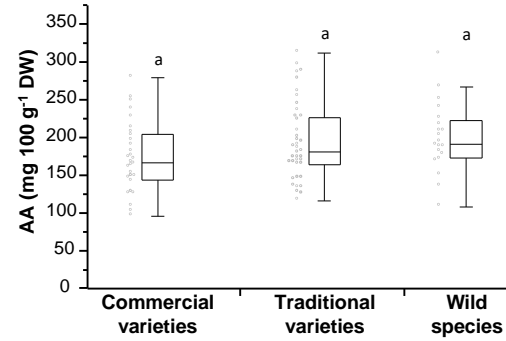
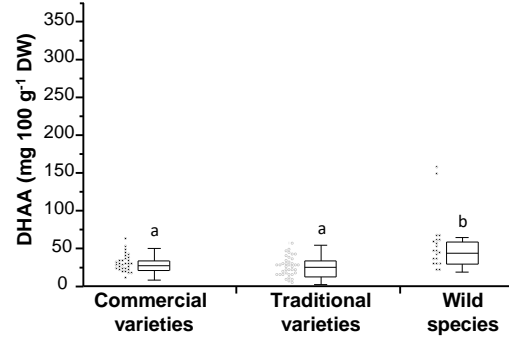


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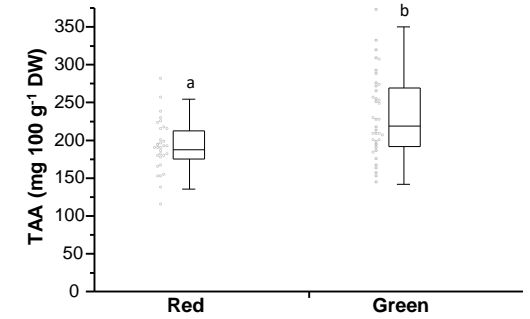
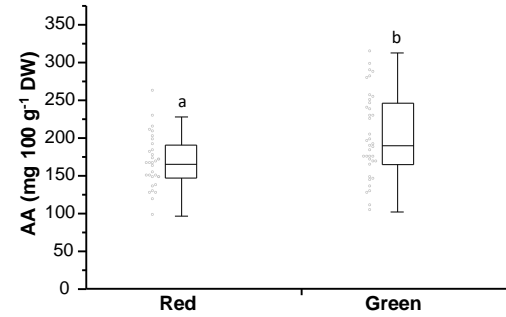
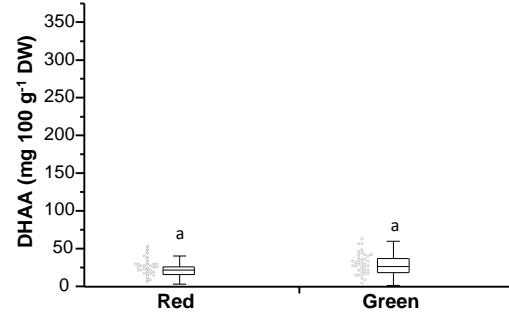
Vitamin C



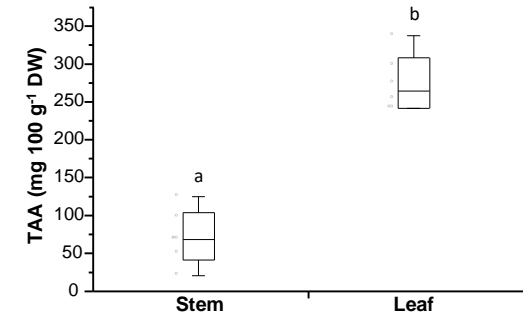
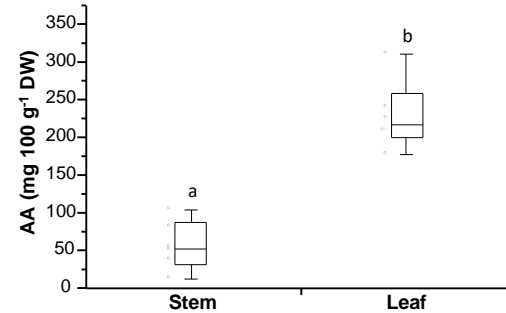
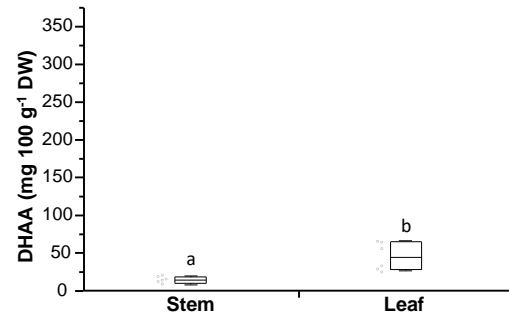
Type of accession



Leaf colour

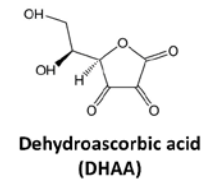
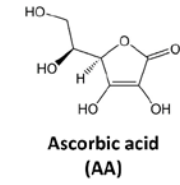
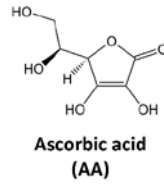
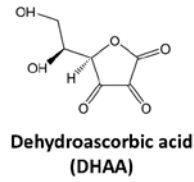


Tissue

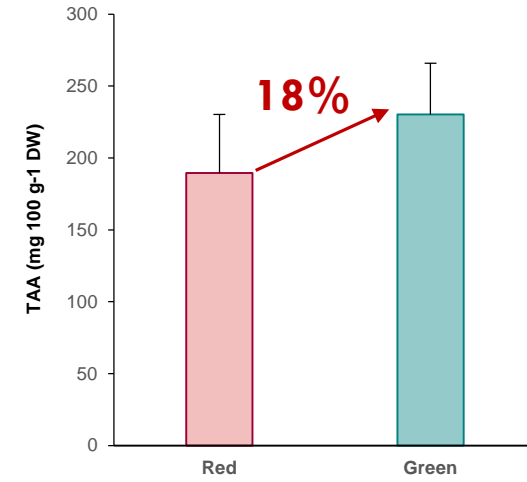
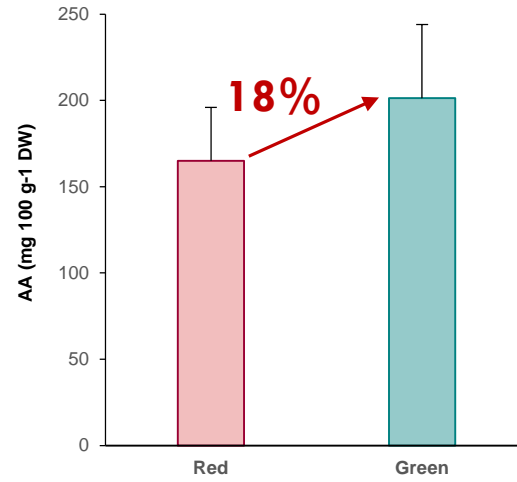
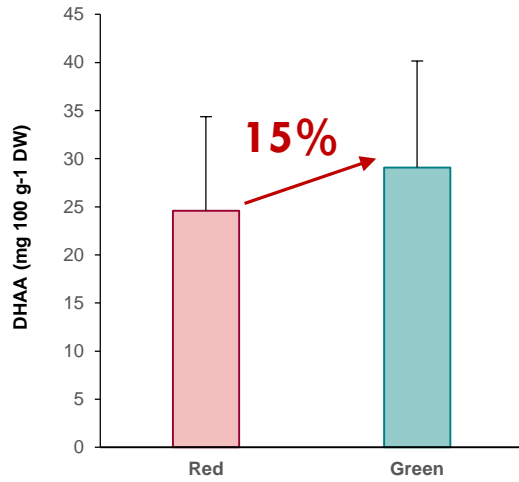
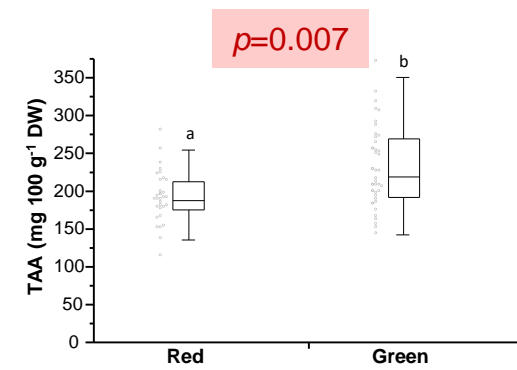
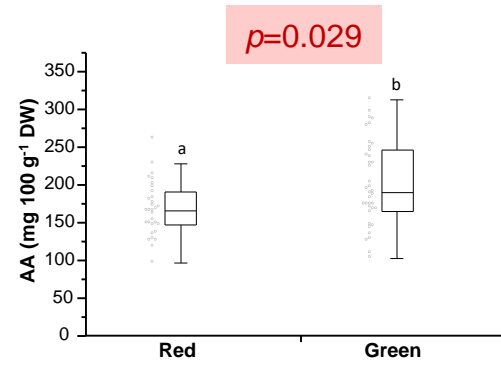
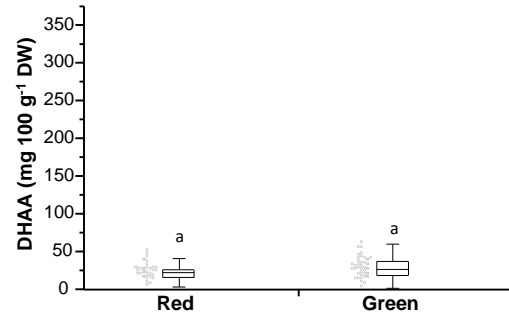


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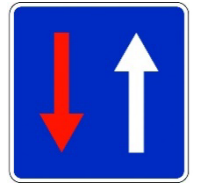
Vitamin C



Leaf colour



Anthocyanins

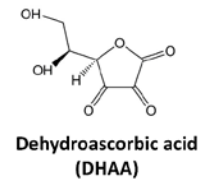
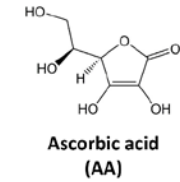
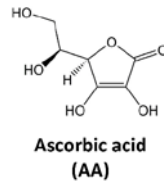
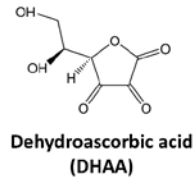


Vitamin C

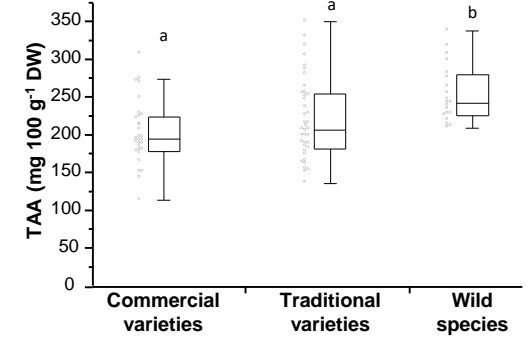
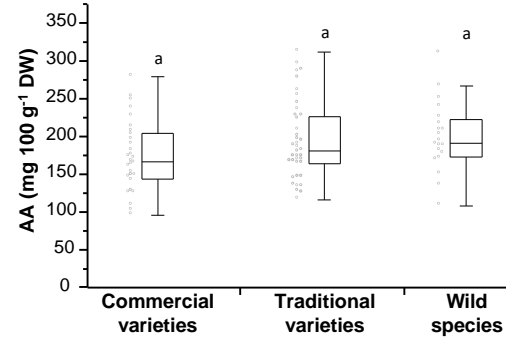
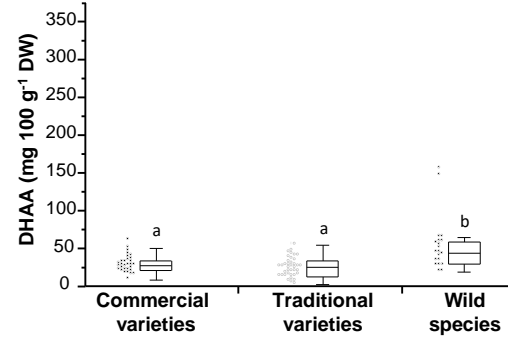


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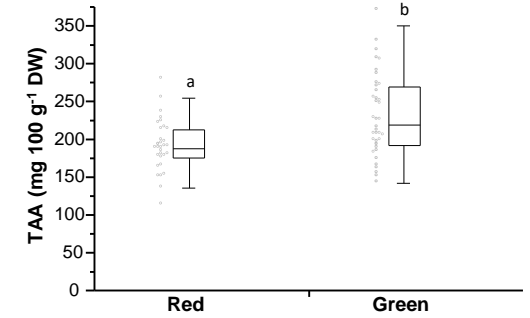
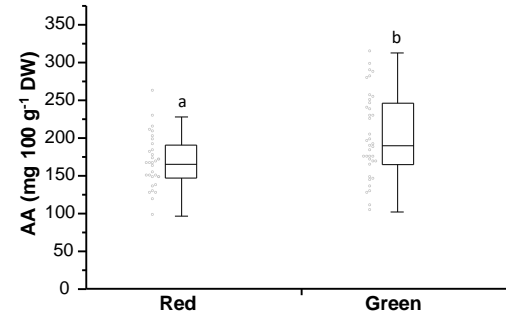
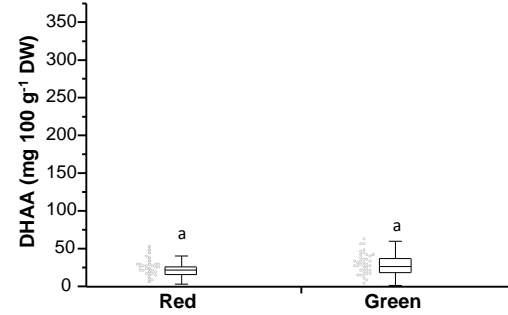
Vitamin C



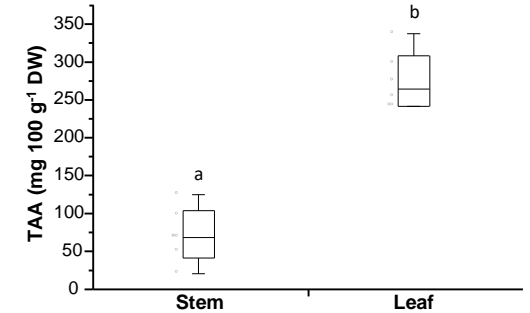
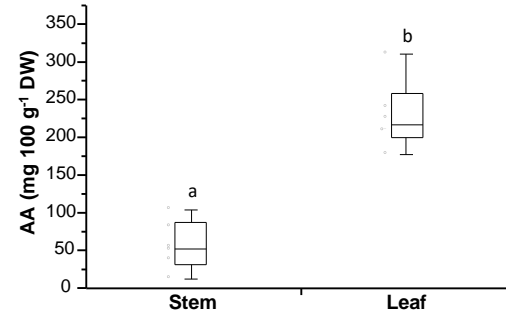
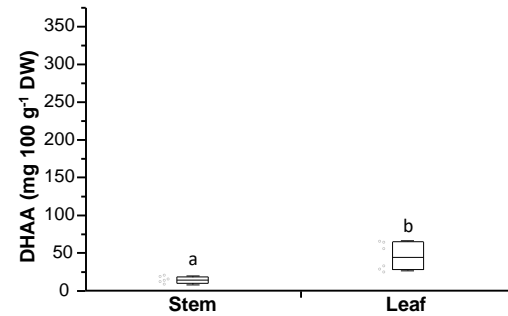
Type of accession



Leaf colour

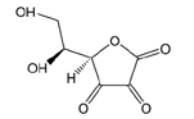


Tissue



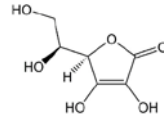
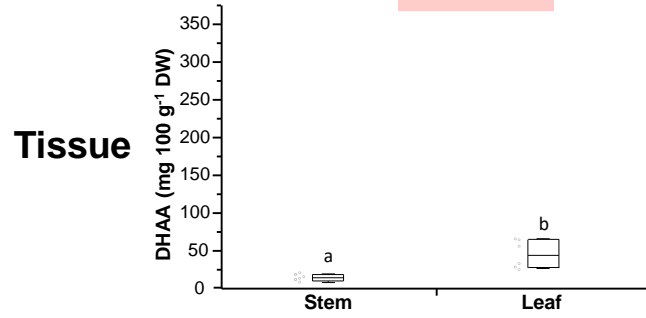
Assessment of vitamin C and anthocyanin content of lettuce germplasm (*Lactuca* spp.)

Vitamin C



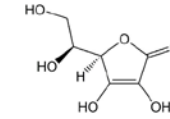
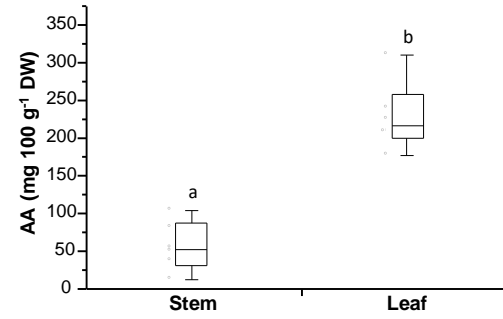
Dehydroascorbic acid (DHAA)

$p=0.045$

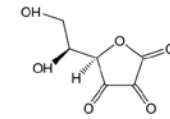


Ascorbic acid (AA)

$p=0.019$

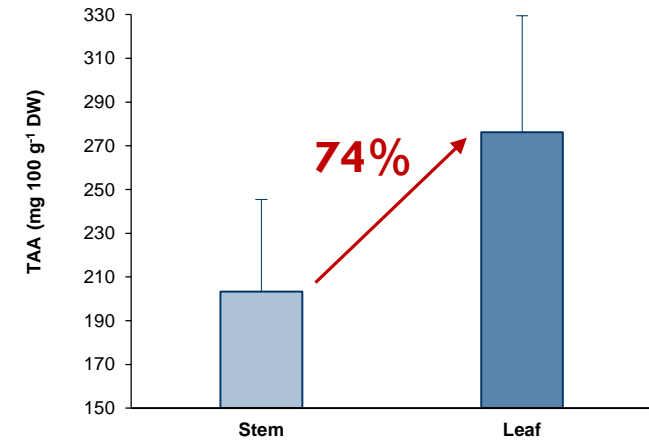
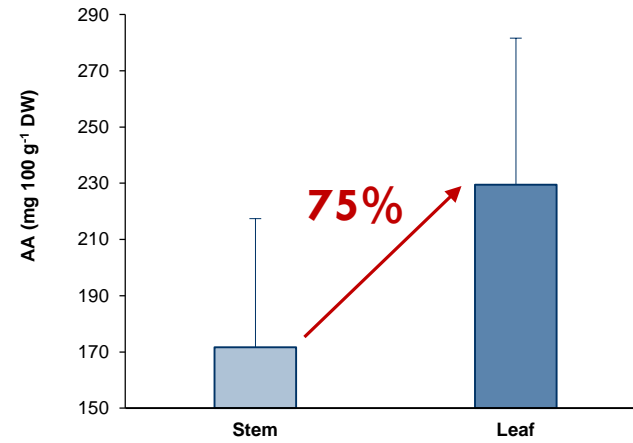
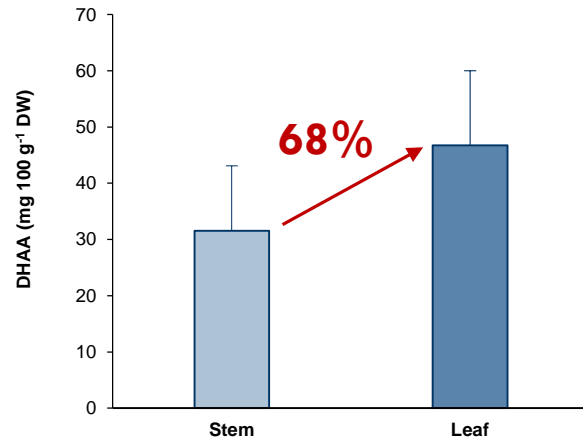
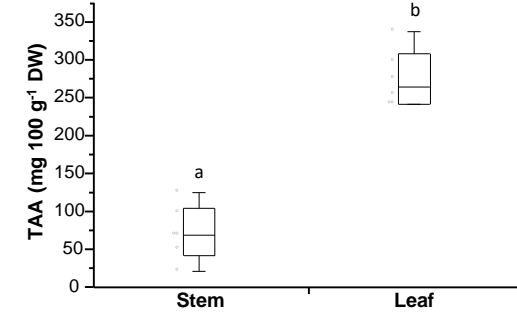


Ascorbic acid (AA)



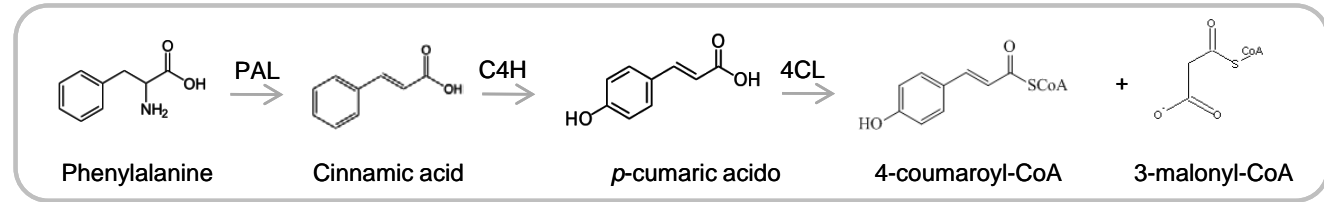
Dehydroascorbic acid (DHAA)

$p=0.018$

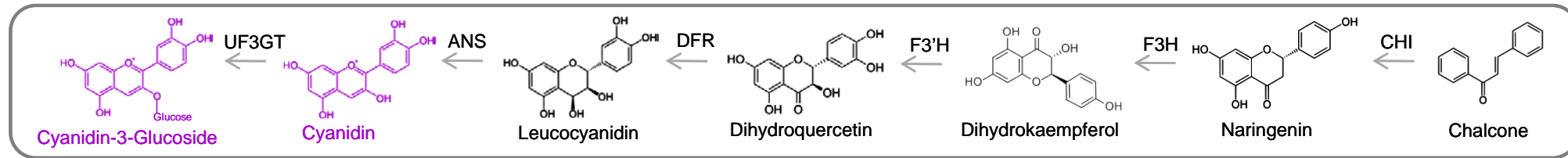


Anthocyanins

Phenylpropanoid pathway

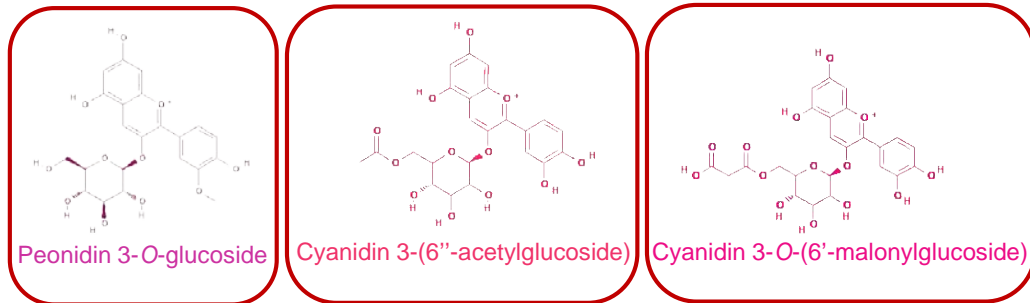


Flavonoid pathway

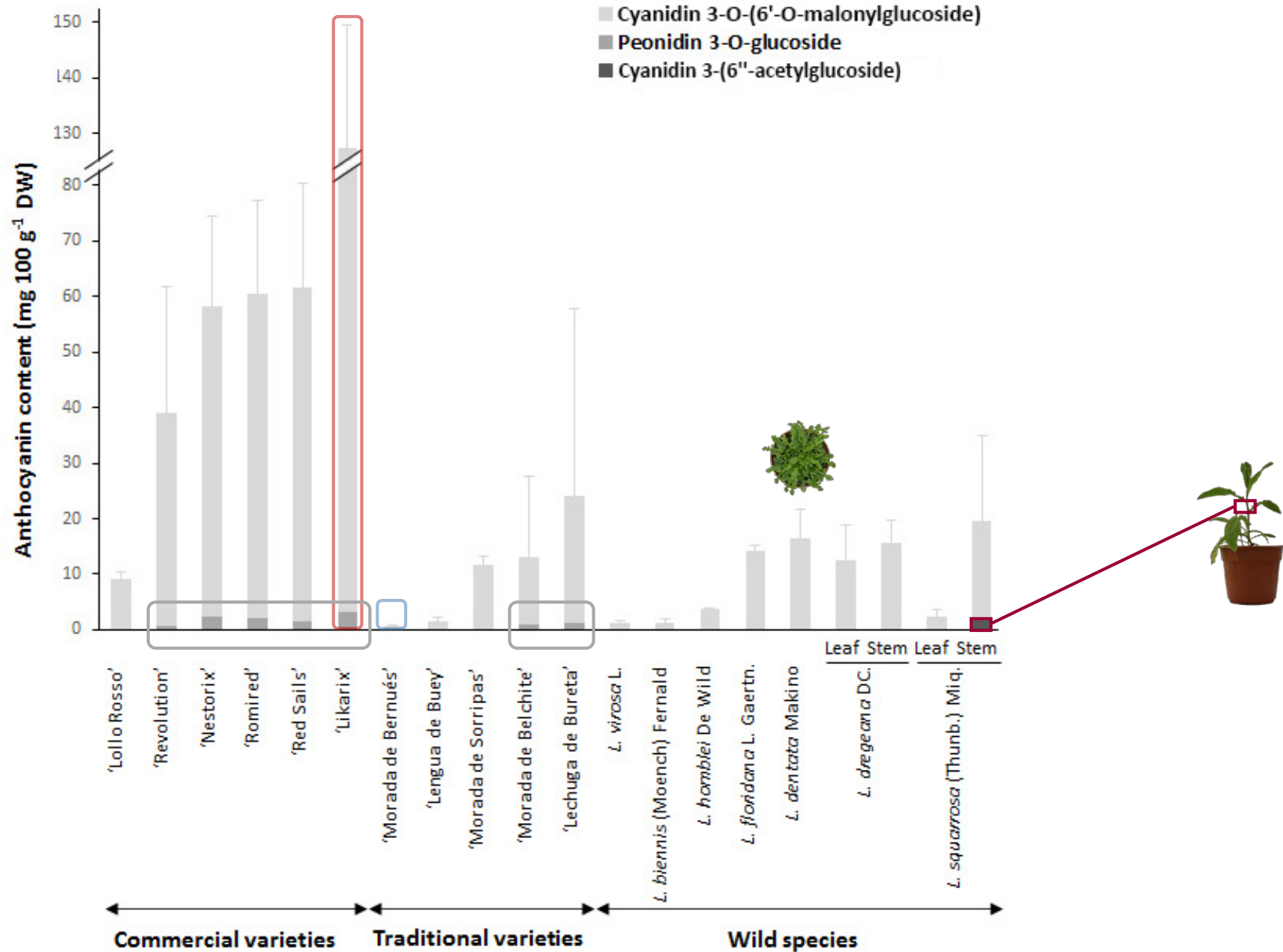


↓ CHS

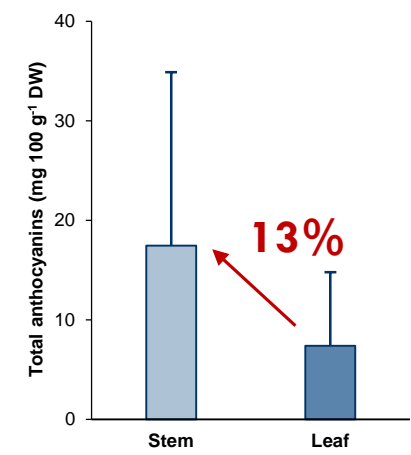
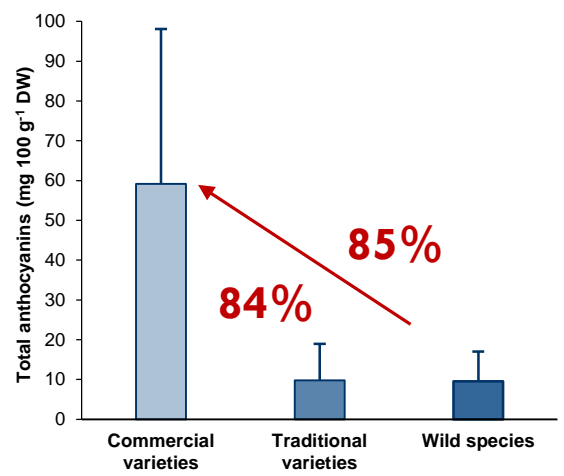
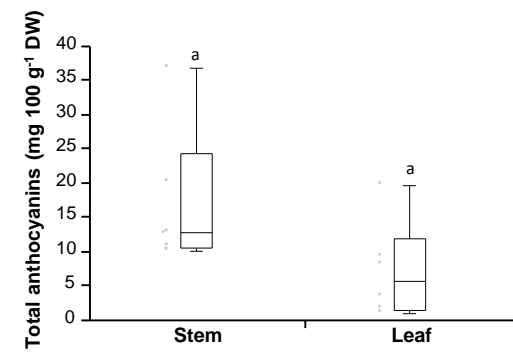
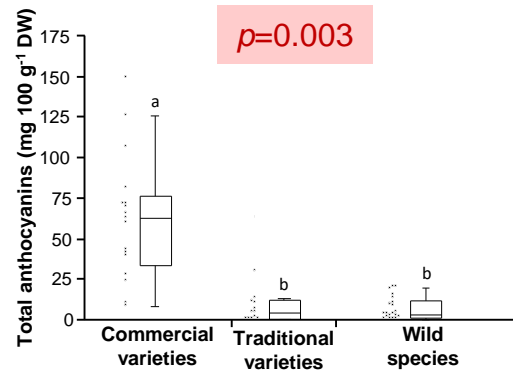
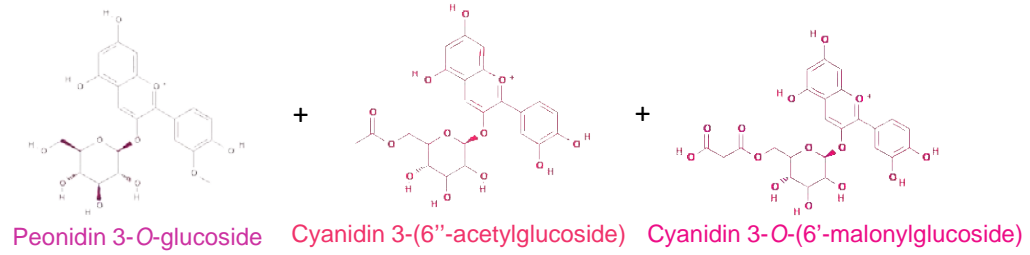
OMT
Addition of different sugar decorations



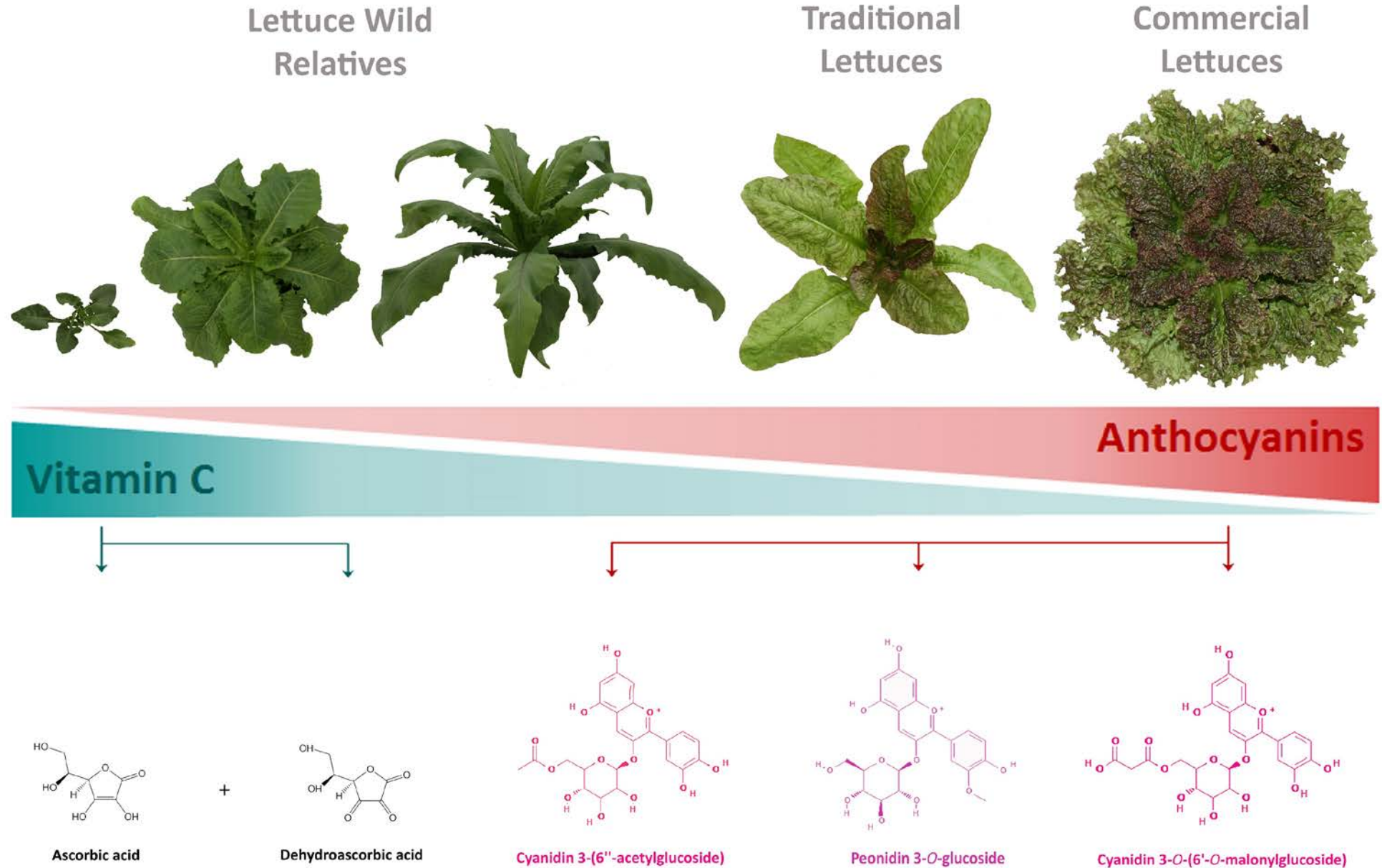
Anthocyanins



Anthocyanins

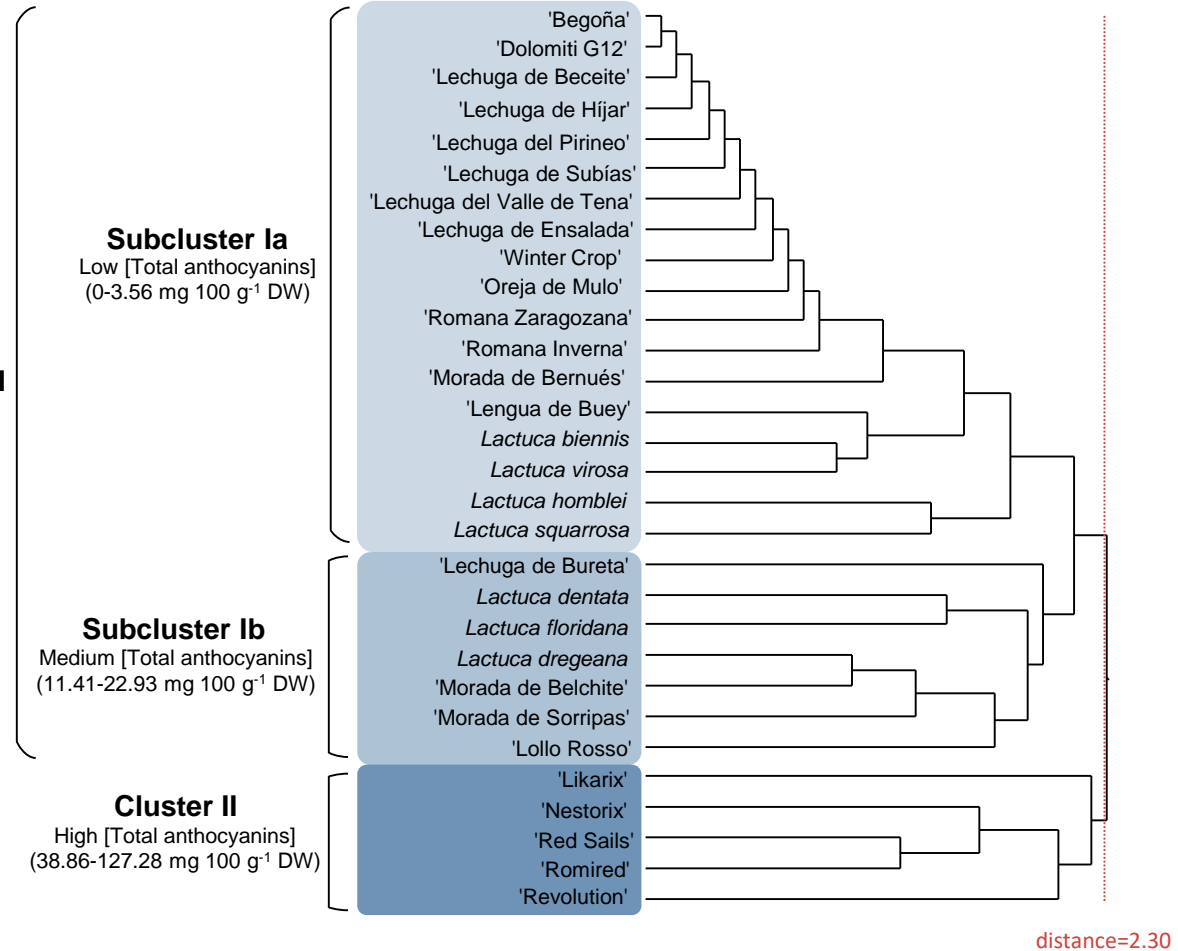
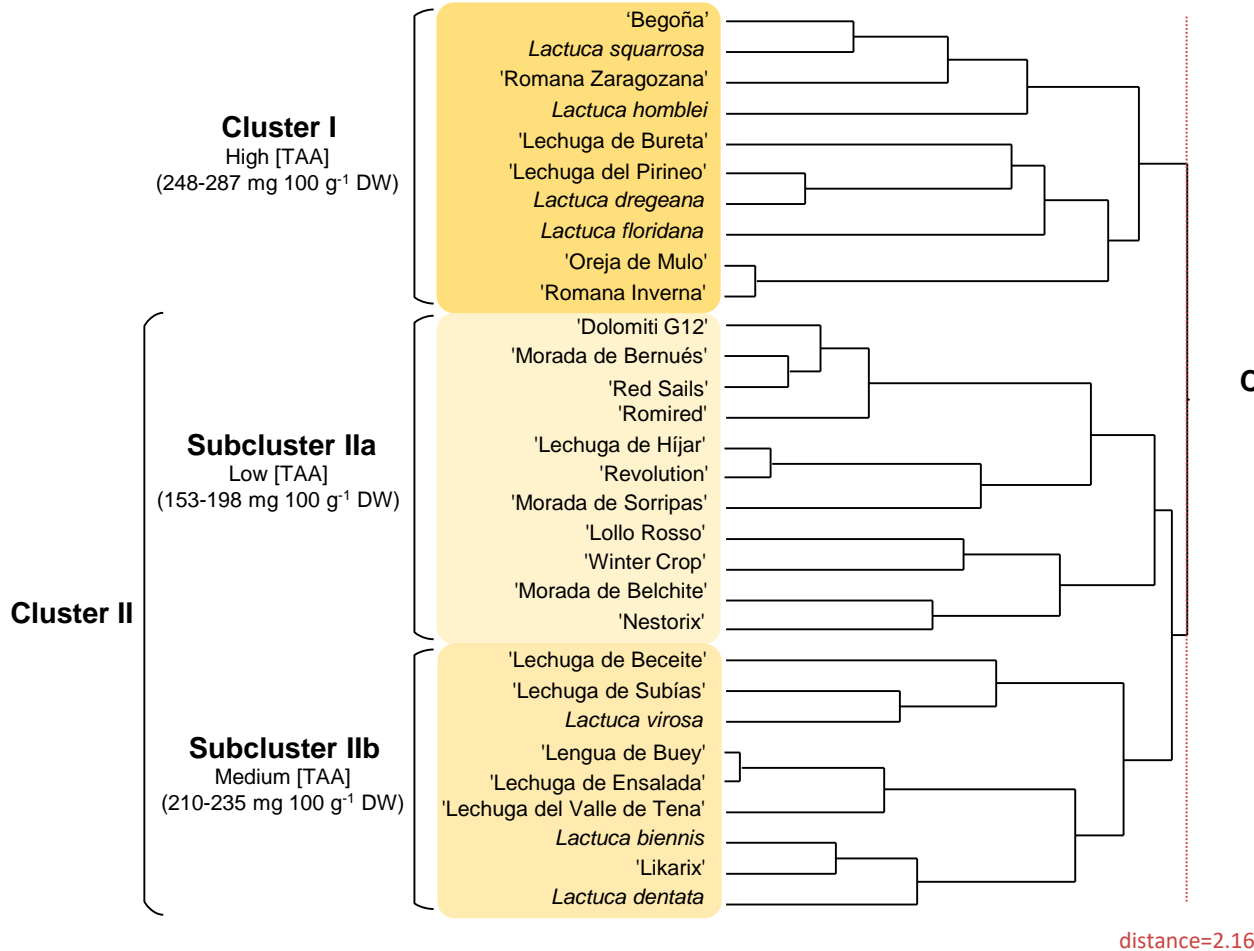


Assessment of vitamin C and anthocyanin content of lettuce germplasm (*Lactuca* spp.)

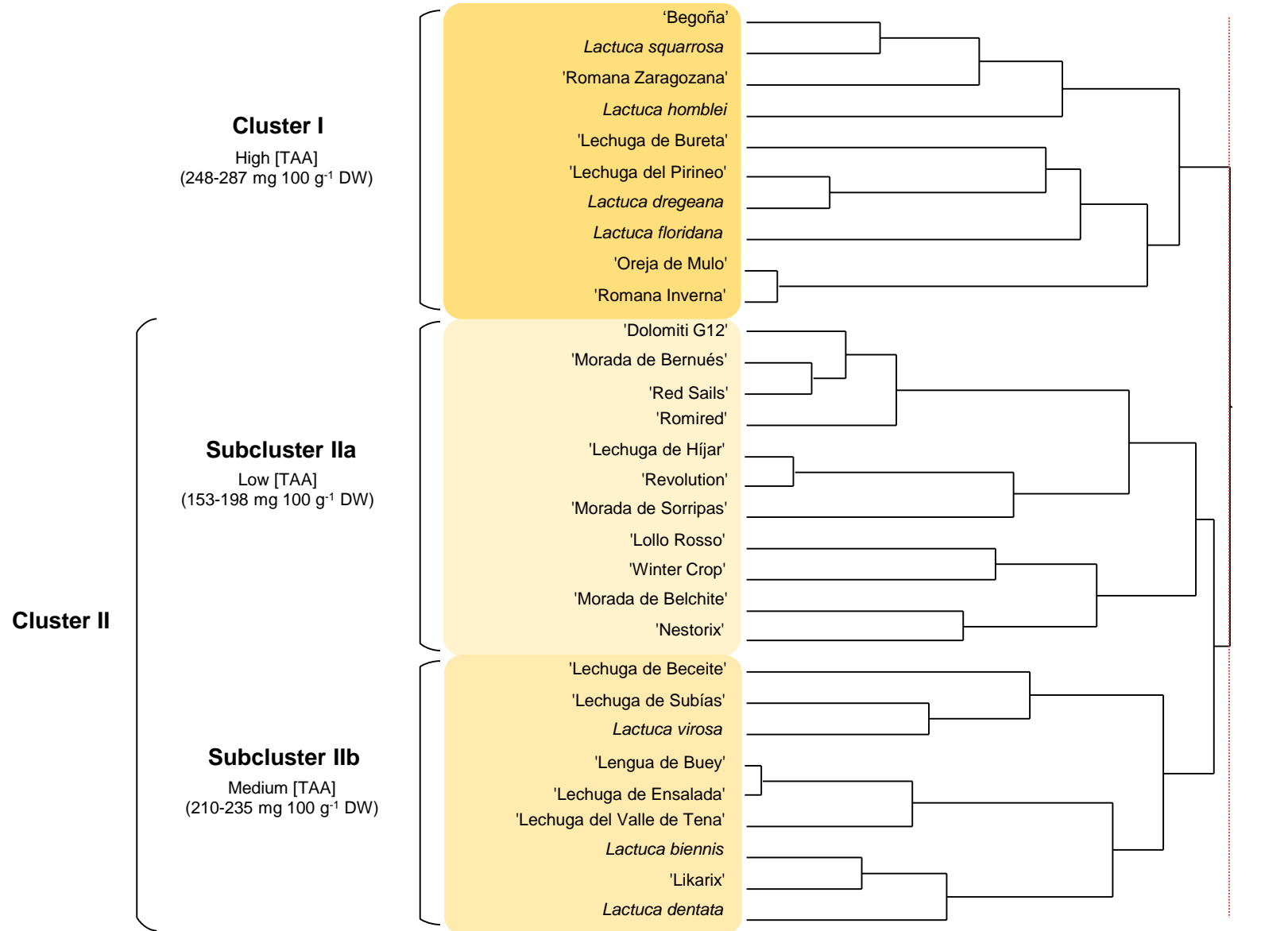


Vitamin C

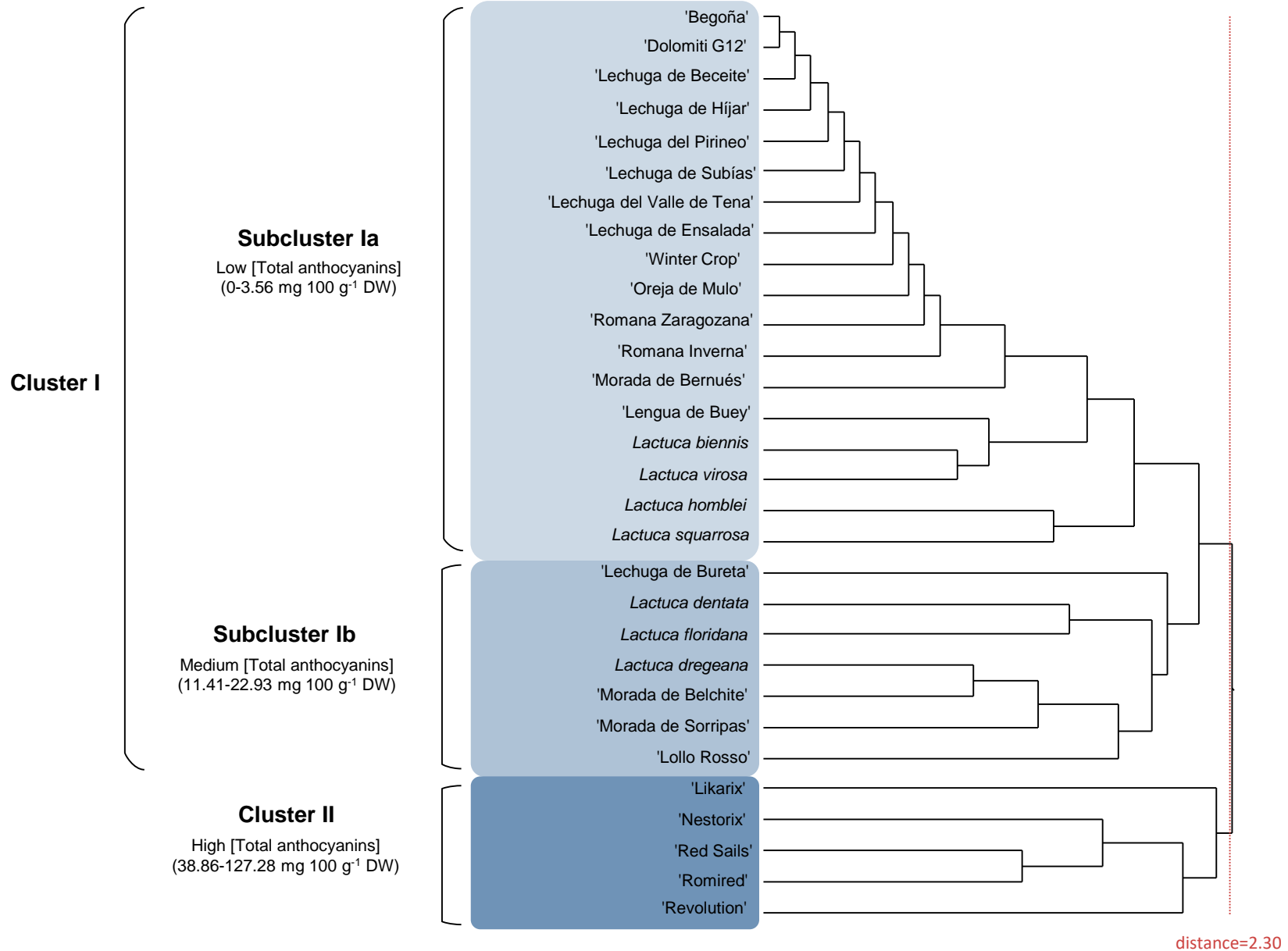
Anthocyanins



Vitamin C



Anthocyanins



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Thanks for your attention!

Assessment of vitamin C and anthocyanin content of lettuce germplasm (*Lactuca* spp.)



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