'*Candidatus* Phytoplasma asteris' First find in commercial carrot crop in the UK

Carolyn Nisbet

UK Potato Quarantine Unit

Plant Biosecurity and Inspections Branch

SASA

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Carrot survey - background

- Lso present in Europe in carrots and is seed transmitted
- Survey of all Scottish carrot growers based on symptoms
- Symptoms of Lso in carrot
    - leaf curling
    - leaf yellowing and reddening
    - presence of adventitious roots

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Carrot showing leaf yellowing

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Carrot showing adventitious roots

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Carrot survey

Four carrots showing symptoms of Lso were sent SASA for testing in 2013

- tested negative for Lso

- positive for phytoplasma

- sequencing of the nested PCR product confirmed the presence of phytoplasma

- Further sequencing of the first and second round PCR products resulted in a 1408nt partial concensus sequence

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Carrot survey

- Two other cultivars of carrot grown in field trial plots at SASA were also found to have similar symptoms
- Leaf samples were collected from five plants and tested by PCR. All five plants were infected with '*Ca.* Phytoplasma asteris'

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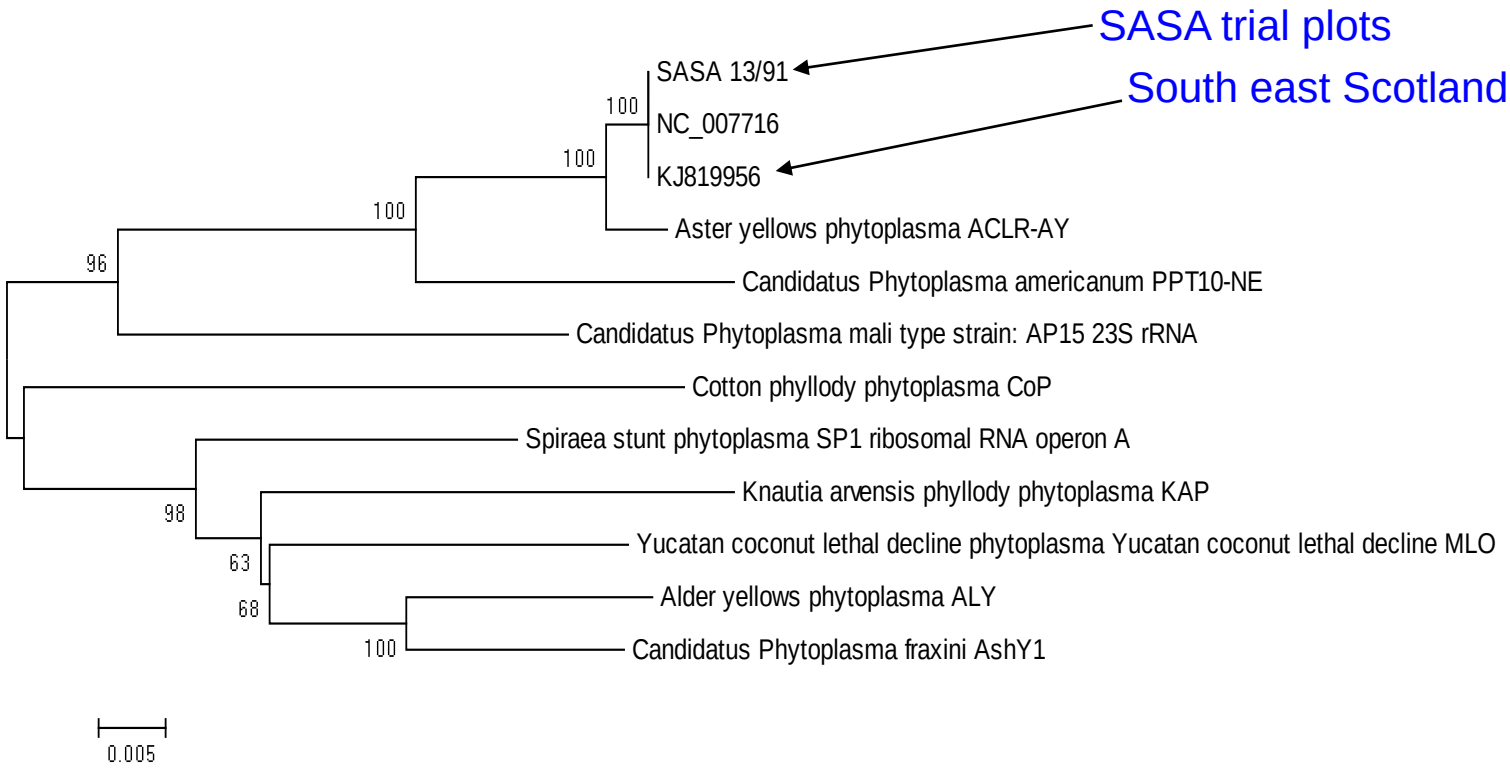
Carrot survey - results

100% identical to the reference strain sequence of '*Ca.* Phytoplasma asteris' (NC_007716)



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Carrot survey

- '*Ca.* Phytoplasma asteris' infects a wide range of host plants including crops, trees and weeds
- transmitted by insect vectors of the order Hemiptera in a persistent propagative manner, however no leafhoppers or planthoppers were observed within the carrot fields at the time of sampling
- seed transmitted?

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Carrot Field – Southeast Scotland

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Carrot survey - results

Leaf samples were collected from six non-symptomatic carrot and other non-carrot plants

- beech tree (*Fagus sylvatica*)
- *Chenopodium* sp.
- *Fumaria* sp.
- pansey (*Viola tricolour*)
- parsnip (*Pastinaca sativa)*
- nettle (*Urtica dioica*)

All tested negative for '*Ca.* Phytoplasma asteris'

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Carrot survey – seed transmission?

- 1000 seed of each of the SASA cultivars have been planted under glass
- observe for symptoms
- some yellowing testing will be carried out in the next few weeks.

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Carrot survey - conclusion

'*Ca.* Phytoplasma asteris' has been recorded in the UK affecting

- Hebe
- apple (*Malus domestica*)
- day-lily (*Hemerocallis* sp.), and
- wild carrot

This is the first find of '*Ca.* Phytoplasma asteris‘ in commercial carrot crop in the UK

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Acknowledgement

- Susan Ross
- Wendy Monger
- Fiona Highet
- Colin Jeffries

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