

# Carlavirus in Beans - a new disease

**Horticulture**  
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Australia

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 **Queensland**  
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# Green beans

- **Industry value: \$75m**
- **QLD: 80% Vic: 15%**
- **Summer production in SE Qld; winter production north Qld (Bowen)**
- **Crops harvested 9 to 11 weeks after planting**



- **Beans natural host of at least 30 viruses worldwide**
- **Industry limiting diseases caused by several begomoviruses and potyviruses overseas**
- **In Australia, bean summer death (TYDV) and bean common mosaic virus well controlled through cultivar resistance**



# Bean virus – south Queensland 2016

- **French bean crops in Fassifern area in summer/ autumn 2016 had high % of plants with leaf mottling and curled, twisted and discoloured pods**
- **Significant crop losses through crop failure and downgrading and extensive culling of product in packing shed**
- **Potyvirus e.g. bean common mosaic virus (BCMV) eliminated as possible cause and a Carlavirus in the Cowpea mild mottle group consistently found in infected plants**
- **This was the first record of this virus group from legumes in Australia**



**CPMMV infected French beans with green mottle symptoms and deformed, twisted pods**

# CPMMV soybean

- A related virus was found in soybean from the Lockyer valley at same time (April 2016)
- Virus in bean and soybean identified by RT – PCR with primers targeting coat protein (CP)
- Phylogenetic analysis clearly indicated bean and soybean isolates from Qld distinct isolates of CPMMV

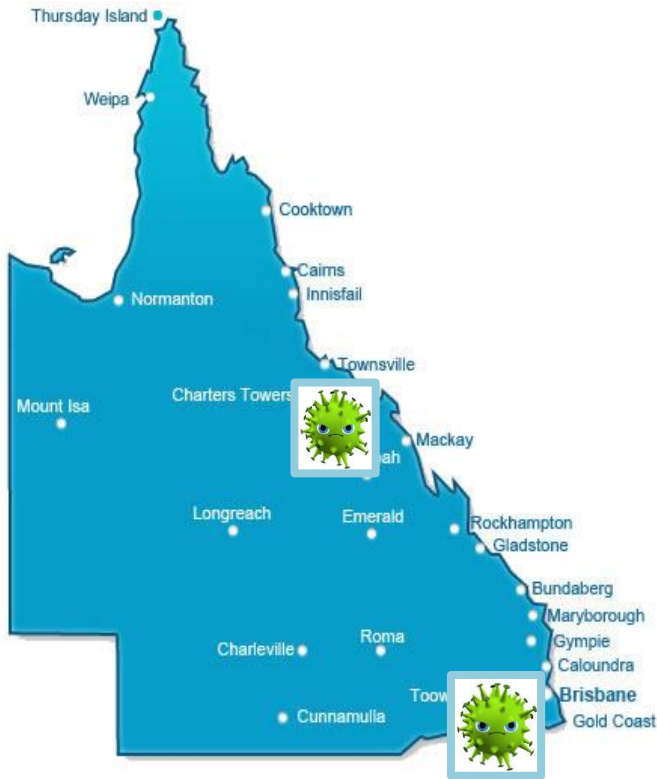


**Soybean. Field infection**



**Soybean. Glasshouse test**

# Queensland CPMMV - what do we know?



- Found in French bean at Kalbar in April 2016, and in bean at Bowen in August 2016
- Virus present in 2017 in south Qld production areas
- CPMMV group is genetically variable and the Qld isolates do not seem to be closely related to available viral sequences from other countries
- Whitefly transmission (MEAM1 *Bemisia tabaci*) confirmed in lab tests for both bean and soybean isolates

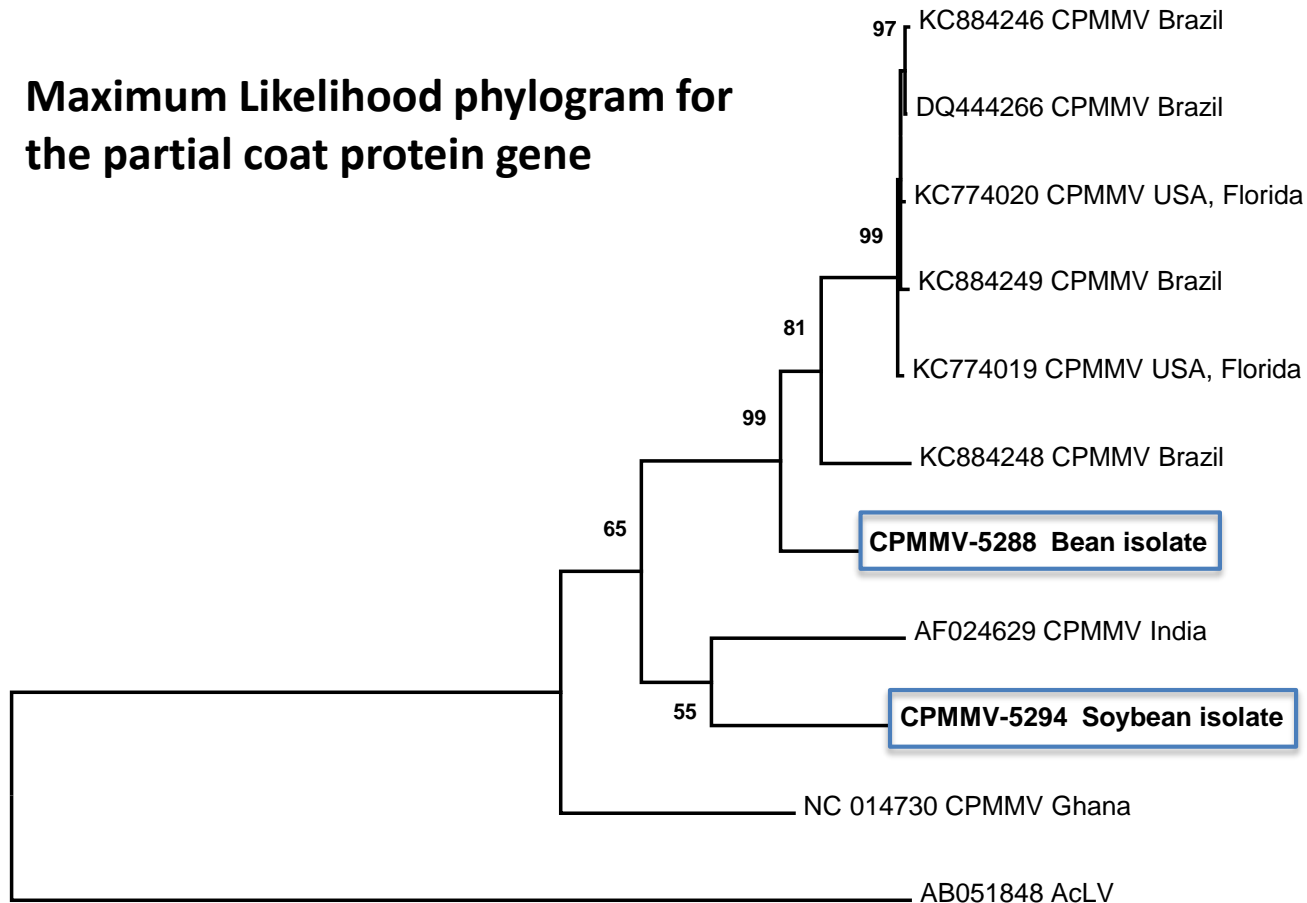
# CPMMV hosts



- **Natural field hosts of bean virus in Fassifern were French bean, soybean and mung bean**
- **Hosts of CPMMV from Fassifern in glasshouse inoculation tests were French bean (20 varieties), soybean, cowpea, mung bean, Adzuki bean, Phasey bean**
- **Non-host species include: chickpea, lucerne, peanut, tomato in inoculation test**

# CPMMV genetic diversity

Maximum Likelihood phylogram for the partial coat protein gene



**Bean and soybean isolates only share 71% nt identity in this region**

0.2



# CPMMV and Australia

- **Likely a recent incursion into Australia. Within last 10 years?**
- **More than one incursion based on phylogenetic data from Qld isolates**
- **Grain legume seed most likely pathway e.g. soybean, mung bean, *Phaseolus* species**
- **Negative evidence to date**

# Seed transmission tests - Queensland

- **Not detected in grow out tests of commercial seed lots of bean, soybean and mung bean**
  - **French bean (1864 young plants tested)**
  - **soybean (2000 plants)**
  - **mung bean (1768 plants)**



# Future work/ scenarios

- **Further work on epidemiology, genetic diversity, host range and seed transmission of Qld isolates**
- **Virus established in south Qld and potential threat to both bean and soybean**
- **CPMMV currently an issue with bean production in Brazil**
- **Seen as threat to US soybean industry**
- **Damaging in winter nurseries in Puerto Rico and many varieties react severely to virus.**

