

Clubroot (*Plasmodiophora brassicae*) resistant brassica variety trials (2015-16)

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The easiest and most economical strategy to manage the soilborne pathogen clubroot is to grow resistant varieties. Doing so requires no change to a grower's farming practices. Many varieties that have purported clubroot resistance have been bred in Europe and have not been tested against the dominant races present in the PNW, or have not been thoroughly tested in western Oregon. Based on current research conducted in Oregon's Willamette Valley, the only race identified was 16/2/30 using the European Clubroot Differential set (Heinrich et al., 2017). Past work (Dobson et al., 1983) had identified the presence of races 16/2/31 and 16/3/31 in western Oregon.

Our objective was to evaluate the performance of commercially available brassica varieties that claim to have clubroot resistance. Resistance to clubroot was evaluated by growing "resistant" varieties along with a susceptible "check" either on farms infected with clubroot that were located in the Willamette Valley or in the greenhouse by infecting soil with the pathogen.

Use of resistant varieties must be part of an integrated clubroot control strategy that includes crop rotation out of brassicas (minimum 4 yrs, though longer is better), sanitation to prevent spread of the disease, good irrigation management, eliminating host weeds, and liming to a soil pH of 7 or greater. **Heavy reliance on resistant varieties (e.g., planting resistant varieties in the same field with short rotation intervals out of brassicas) may lead to the selection of a disease population that overcomes resistance.** For more information on clubroot control strategies see OSU Extension publication **EM9148-Integrated Clubroot Management for Brassicas: Nonchemical control strategies.**

Crop	Source	Variety	Resistance ¹	Days to harvest ⁴	Remarks
Broccoli	Sakata	Emerald Jewel	H ^{2,3}	80-90	Matures several weeks later than most other varieties non-uniform head maturity and size
Brussels	Syngenta	Crispus	H ²	NA	
Cauliflower	Syngenta	Clapton	H ²	110-120	
Cauliflower	Syngenta	Clarify	H ²	85-95	
Kohlrabi	Rijk Zwaan	Lech	None ^{2,3}	NA	
Kohlrabi	Hild	Azur-Star	L ^{2,3}	NA	Uniform purple "bulbs"
Napa Cabbage	Bejo	Emiko	H ²	60-70	
Napa Cabbage	Bejo	Bilko	H ^{2,3}	60-70	
Napa Cabbage	Bejo	Pacifico	H ²	60-70	
Napa cabbage	Sakata	China Gold	H ^{2,3}	60-70	
Napa cabbage	Sakata	Yuki	H ^{2,3}	60-70	
Napa Cabbage	Seed Science	Panda	H ²	60-70	
Napa Cabbage	Asia Seed	Chun Dae Gil	L ²	60-70	
Pak choi	Sakata	Feng Qing Choi	None ^{2,3}	NA	
Pak choi	Sakata	Mei Quing Choi	None ²	NA	

Crop	Source	Variety	Resistance ¹	Days to harvest ⁴	Remarks
Turnip	Kobayashi	Scarlet Queen	None ^{2,3}	NA	
Turnip	Takii	Purple Prince	H ^{2,3}	NA	
European cabbage	Syngenta	Kilaton	H ^{2,3}	120-140	White; late maturing for storage and fresh market. Average head weight in our trial was 4.2 lbs
European cabbage	Syngenta	Tekila	H ^{2,3}	85-95	White; dense, tightly packed heads, uniform maturity and head size. Average head weight in our trials was 3.8 lbs
European cabbage	Syngenta	Kilagreg	H ^{2,3}	65-85	White; early maturing, good for fresh market and processing, good substitute for many early season varieties, 3-4 lb heads
European cabbage	Bejo	Lodero	H ^{2,3}	120+	Red; maincrop storage variety, very slow maturing, non-uniform maturity and did not perform well in our trials
Rutabaga	Tozer	Marion	M to H ^{2,3}	NA	The “susceptible” check, ‘American Purple Top’ was just as resistant. High inherent resistance in napus species.

1- Relative clubroot resistance compared to a susceptible “check” variety for each crop ($100 \times \text{resistant variety disease incidence} \div \text{susceptible variety disease incidence}$; H= high (<10% of plants infected), M= moderate (>10% but <40%), L= low (>40% but <70%), and N= none (>70%))

2- Greenhouse trial where 1 ml of a spore solution (10^7 spores/ml created from clubs collected from 5 farms in western Oregon) was pipetted into each planting hole before seeding

3- Cooperator field trials using either direct seeded or transplants into fields with a history of clubroot

4- Plants were transplanted from late April through mid-July and harvested during September

Dobson, R.L., J. Robak, and R.L. Gabrielson. 1983. Pathotypes of *Plasmodiophora brassicae* in Washington, Oregon, and California. *Plant Disease* 67:269-271

2017. Heinrich, A.L., S. Kawai, and J. Myers. Screening brassica cultivars for resistance to western Oregon clubroot pathotypes. *HortTechnology* 27:510-516

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