The idea behind grafting

Scion: Hort traits

Rootstocks: Disease resistance & Hort Traits

Bacterial wilt

Southern blight

Fusarium wilt

Verticillium wilt

Root-knot nematodes

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Grafting of vegetables: Traditional tool used in vegetable production since early 20th century (Japan, Korea, Taiwan),

81% (Japan) and 54% (South Korea) are grafted vegetables. Popular in the Mediterranean.

Can we use hybrid rootstocks for management of bacterial wilt and root knot nematodes?

BHN 602- scion (BW and RK susceptible)

TSWV resistant, Ideal for both spring and fall production

Hybrid Rootstocks
RST 105 (dp seeds)
RST 106 (dp seeds)
BHN 998 (BHN seeds)
BHN 1053 (BHN seeds)
BHN 1054 (BHN seeds)
Jjak Kkung (Seminis)
Cheong Gang (Seminis)

Hawaii 7998

BHN 602 (self-grafting)

BHN 602 (non-grafted)

Quincy, FL, Fall 2010

Entry [y]	Fruit yield (kg·ha^{-1})				
	Medium	Large	Extra large	Total marketable	Bacterial wilt incidence (%)
Cheong Gang	3,026 ab [z]	7,455 ab	18,293 abc	28,733 ab	28.4 d
BHN 998	2,663 ab	5,661 b	21,870 ab	30,194 ab	40.0 cd
BHN 1054	3,929 a	11,313 a	32,486 a	47,728 a	40.6 cd
Hawaii 7998	1,311 bc	2,877 bc	7,595 bc	11,784 bc	53.6 bc
RST-04-106-T	1,320 bc	2,916 bc	7,160 bc	11,395 bc	57.8 bc
Jjak Kkung	1,385 bc	2,264 bc	3,785 bc	7,434 bc	67.9 b
BHN 1053	1,505 bc	3,060 bc	10,494 b	15,059 bc	76.1 ab
Non-grafted	102 c	75 c	199 c	376 c	93.8 a
Self-grafted	43 c	73 c	117 c	232 c	93.9 a
LSD (0.05)	2142.4	5374.6	19096	25914	24.7
$P > F$	0.0136	0.0040	0.0241	0.0132	<0.0001

[z] Column means followed by different letters are significantly different at $P \leq 0.05$ based on Least Significant Difference (LSD).

[y] Each entry consisted of 4 replications with 18 plants in each replication, and the experiment was arranged as a randomized complete block design.

Painter, VA, Spring 2010

Entry [y]	Fruit yield (kg·ha^{-1})				
	Medium	Large	Extra large	Total marketable	Bacterial wilt incidence (%)
BHN 1054	5,420 a [z]	16,371 ab	58,158 ab	79,950 a	5.0 c
Cheong Gang	4,113 ab	14,211 bc	60,605 a	78,928 a	6.5 c
BHN 998	4,648 a	14,013 bc	55,645 ab	74,306 a	10.5 c
RST-04-106-T	5,136 a	19,176 a	56,139 ab	80,451 a	13.0 c
BHN 1053	2,459 b	9,852 c	46,551 ab	58,863 ab	43.5 b
Jjak Kkung	4,357 a	9,954 c	35,813 b	50,123 b	56.0 ab
Non-grafted	474 c	1,938 d	13,959 c	16,371 c	85.5 ab
Self-grafted	0 c	0 d	0 c	0 c	97.0 a
LSD (0.05)	1,855	4,390	20,705	24,075	21.1
$P > F$	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

[z] Column means followed by different letters are significantly different at $P \leq 0.05$ based on Least Significant Difference (LSD).

[y] Each entry consisted of 4 replications with 30 plants in each replication, and the experiment was arranged as a randomized complete block design.


‘RST-104-106-T’
‘BHN 602’ - Non-grafted
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Table 1. Root Gall Index (RGI) of the tested rootstocks planted in potting medium inoculated with *Meloidogyne incognita* (Trial 1) and *M. javanica* (Trial 2) and the number of nematode eggs/ gram of roots (Trial 1). The trials were conducted in Spring 2011 in Quincy, FL

Entry	**Root Gall Index (RGI)**		**Number of nematode eggs/gram of root**
	Trial 1 *M. incognita*	Trial 2 *M. javanica*	Trial 1 *M. incognita*
'Jjak Kkung'	0.0 c	0.0 c	33.6 c
'Cheong Gang'	0.0 c	0.0 c	0.0 c
'RST-04-106-T'	0.0 c	0.0 c	0.0 c
'Hawaii 7998'	3.0 b	3.2 b	1,352.0 b
'BHN 998'	0.0 c	0.0 c	0.0 c
'BHN 1053'	0.0 c	0.0 c	14.1 c
'BHN 1054'	0.0 c	0.0 c	6.0 c
'BHN 602'	4.8 a	4.8 a	2,045.6 a

[1] Root Gall Index (RGI)index is a1-10 scale indicating the percentage of roots with root galls (Zeck, 1971) on rootstocks/scion planted in root-knot nematode inoculated potting medium. A total of 2500 eggs were inoculated into each pot before planting (2- to 3-leaf stage) for Trail 1, and 4000 eggs in Trial 2. Eight plants were tested for each entry. The studies were set-up as a randomized complete block design.

[2] Means followed by the same letter are not significantly different at $P \leq 0.05$ by Students Newman Keuls Test.

Table 2. Fruit yield (kg.ha[1]) and Root Gall Index (RGI) of tomato cultivar 'BHN 602' grafted onto root-knot nematode resistant rootstocks. The trial was conducted in Fall 2011 in Quincy, FL

Entry	Fruit yield (kg.ha[1])				Root Gall Index[1] (RGI)
	Medium	Large	Extra Large	Total	
'RST-04-106-T'	6,511 bc[2]	11,905 ab	22,449 b	40,864 bc	1.2 b
'BHN 998'	9,167 a	14,299 a	28,556 a	52,022 a	1.4 b
'BHN 1054'	7,816 ab	15,076 a	23,788 ab	46,680 ab	1.4 b
'BHN 602' Self-grafting	5,413 c	8,532 b	13,380 c	27,325 d	5.7 a
'BHN 602' Non-grafted	6,058 bc	10,496 b	18,593 bc	35,148 cd	5.6 a
LSD	2,165.1	3,559.2	5,303.9	9,722.5	0.9775
P>F	0.0112	0.0049	<0.0001	0.0002	<0.0001

[1] Root Gall Index (RGI) is a1-10 scale indicating the percentage of roots with root galls (Zeck, 1971) on grafted and non-grafted plants in a field naturally infested with root-knot nematode (*M. incognita*). Each entry consisted of 6 replications with 6-12 plants in each replication, and the experiment was arranged as a randomized complete block design.

[2] Column means followed by the same letter are not significantly different at $P \leq 0.05$ based on Least Significant Difference (LSD).

Table 3. Fruit yield (kg.ha[1]) and Root Gall Index (RGI) of tomato cultivar 'BHN 602' grafted onto root-knot nematode resistant rootstocks. The trial was conducted in Fall 2011 in Painter, VA.

Entry	Fruit yield (kg.ha[1])				Root Gall Index[1] (RGI)
	Medium	Large	Extra Large	Total	
'RST-04-106-T'	1,443 a[2]	2,040 ab	3,544 a	7,027 a	0.5 d
'BHN 998'	1,525 a	3,009 a	1,389 b	5,922 a	1.5 c
'BHN 1054'	1,382 a	1,782 b	1,687 ab	4,852 ab	4.5 b
'BHN 602' Non-grafted	474 b	996 b	725 b	2,195 b	6.9 a

[1] Root Gall Index (RGI) is a1-10 scale indicating the percentage of roots with root galls (Zeck, 1971) on grafted and non-grafted plants in a field naturally infested with root-knot nematode (*M. incognita*). Each entry consisted of 6 replications with 6-12 plants in each replication, and the experiment was arranged as a randomized complete block design.

[2] Column means followed by the same letter are not significantly different at $P \leq 0.05$ based on Least Significant Difference (LSD).


‘RST-104-106-T’


‘BHN 998’


‘BHN 1054’


‘BHN 602’ - self grafting


‘BHN 602’ - Non-grafted

‘BHN 602’: RGI 7

GRAFT UNION

A DEMONSTRATION OF THE BASIC PRINCIPLE OF GRAFTING!.

‘BHN 998’: RGI 1

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