

# Characteristics of onion (*Allium cepa* L.) new cultivars with 4 bulb colors

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## ABSTRACT

Onion bulb color is commercially important factor and by the bulb color, onion has different use. Commonly, onion bulb has white, yellow, red, and chartreuse color. In Korea, usually yellow onion is demanded, and almost of red onion is used for salad. Demand for color food has increased, and white, red, and yellow onions have been sold in small packages, but white varieties are not produced and all are imported. White and chartreuse color onion rarely existed commercial cultivars. Rural Development Administration(RDA) developed 4 bulb color(yellow, red, white, chartreuse) cultivars.

Yellow bulb color cultivar 'Maphsihwang' was selected from self-pollination line which selected from 'Geumjungjosang', early maturation cultivar. This cultivar has less pungency, because pyruvate content of 'Maphsihwang' is low and high water content. Onion juice made by 'Maphsihwang' cultivar, has high preference because of less pungency. Its three years average yield is 6,348kg/10a, similar to check cultivar 'Romang'.

Red bulb color cultivar 'Eumjinara' has early maturation than that of check cultivar, 'Cheonjujeok'. 'Eumjinara' was selected from red onion breeding line 'IS1115'. It is resistant to cold and downy mildew infection. Its three years average yield was 6,999 kg/10a, also higher than that of check cultivar.

White bulb color cultivar 'White One' was developed by line separation form 'Southport White Globe 22-1', its bulb color is white also, and later maturity. Bolting and separation of bulb rate is very stable, and has ovate shape. Its bulb weight is 149g, smaller than check cultivar. Its three years average yield is 4,083kg/10a.

'Sweet Green' cultivar has chartreus color, later maturity and higher sugar content than other cultivar. Onion 'Sweet Green' was selected from cross-pollinated the 'Southport White Globe' and the white species 'Shinei', and the population which has high sugar content was selected. 'Sweet Green' bulb color is different from common onion varieties and very high sugar content and hardness, so its characteristics are suitable for salad and onion juice, which will contribute to creating new demand. Its three years average yield is 4,424kg/10a.

## MATERIAL AND METHODS

- Plant material : Maphsihwang, Eumjinara, White One, Sweet Green
- Onion bulb production
  - Sowing date : September 20<sup>th</sup>
  - Planting date : November 10<sup>th</sup>
- Seed harvest method
  - Sowing date of bulb : November 25<sup>th</sup>
  - Seed Production : Separation net installation, Pollinator(*Lucilia illustris*)
- Investigating items : Plant height, No. of leaf et al

## RESULTS

Table 1. Inheritance of plant characteristics of onion varieties

Cultivar	Foliage attitude	Leaf color	Bulb shape	Bulb color	Lodging date
Maphsihwang	Erect	Green	Circular	Yellow	May 4
Check(Romang)	Erect	Green	Circular	Yellow	May 6
Eumjinara	Erect	Deep Green	Circular	Red	May 31
White one	Erect	Green	Circular	White	May 29
Sweet green	Erect	Green	Globe	Greenish-yellow	May 29
Check(Cheonjujeok)	Elect	Deep Green	Broad elliptic	Red	Jun 5

Table 2. Yield characteristics of onion varieties

Cultivar	Foliage length (cm)	Leaf number	Pseudostem diameter(cm)
Maphsihwang	54.0	7.8	1.45
Check(Romang)	64.0	7.6	1.72
Eumjinara	62.7	7.7	1.71
White one	64.3	8.0	1.73
Sweet green	61.4	7.4	1.44
Check(Cheonjujeok)	62.1	8.1	1.74

Cultivar	Bolting %	Bulb <sup>z</sup> index	Bulb weight (g)
Maphsihwang	19.9	88	267
Check(Romang)	34.9	83	295
Eumjinara	0.0	99	234
White one	0.0	129	149
Sweet green	1.0	105	154
Check(Cheonjujeok)	0.3	83	237

<sup>z</sup> Bulb index = [Bulb height/Bulb diameter]×100

Table 3. Yield (kg/10a) of onion varieties on the regional yield trials at 3 locations

Location	Sweet green (A)			Index (A/B)	Check (B)				
	Muan	Goheung	Namhae		Muan	Goheung	Namhae	Mean	
Maphsihwang	6,273	8,452	6,756	7,160	109	6,309	8,192	5,196	6,566
Eumjinara	7,679	7,989	5,965	7,211	109	6,055	7,464	6,336	6,618
White one	3,679	2,287	2,207	2,724	41	-	-	-	-
Sweet green	4,330	4,052	4,889	4,424	67	-	-	-	-

Table 4. Content of sucrose, fructose, glucose, and total sugar contents of onion varieties and check cultivar

Cultivar	SSC (Brix <sup>o</sup> , %)	Pyruvic acid (umol/ml)	Sugars(g/L)			Total sugar
			Fructose	Glucose	Sucrose	
Maphsihwang	6.8	3.162	-	-	-	-
Check (Romang)	8.1	3.564	-	-	-	-
Eumjinara	7.67	-	17.13	16.44	7.56	41.43
Sweet green	12.71	9.52	31.91	34.53	7.15	73.59
Check (Cheonjujeok)	8.57	9.33	20.42	26.29b	6.15	52.86

Table 5. Resistance of downey mildew, cold tolerance, and storage ability of onion varieties

Cultivar	Downey mildew	Cold tolerance	Soft rot
Maphsihwang	MR <sup>z</sup>	MR	MR
Check(Romang)	S <sup>x</sup>	MR	S
Eumjinara	R <sup>y</sup>	R	MR
White one	MR	MR	R
Sweet green	MR	R	-
Check(Cheonjujeok)	MR	R	MR

<sup>z</sup> MR; Moderate resistance, <sup>y</sup> R; Resistance, <sup>x</sup> S ; susceptible

Table 6. Rotting and sprouting percentage of onion varieties stored after 12 week at ambient condition

Cultivar	Rotting(%)	Sprouting(%)	Storability(%)
Maphsihwang	49.2	16.3	34.3
Check(Romang)	41.3	13.2	45.4
Eumjinara			
White one	46.2	0.0	53.8
Sweet green	9.6	0.0	91.4
Check	20.1	0.9	79.0



Fig. 1. 'Maphsihwang'(A), 'Eumjinara'(B), 'White one'(C), 'Sweet green'(D)