

Broccoli Trials—1985

By David E. Hill

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A recent marketing survey by the Food Industry Institute at Michigan State University reported that, among all common vegetables grown in the United States, broccoli leads with a 169% increase in per capita consumption in the past 10 years. During this time production increased from 200,000 tons in 1974 to 500,000 tons in 1984 in the major producing states of Arizona, California, Oregon, and Texas.

Broccoli is a member of the genus *Brassica*, along with cabbage, cauliflower, and brussels sprouts, which has been recently widely publicized by the American Medical Association as an important component of human diet. Its consumption has also increased because of wide availability in salad bars and inclusion in prepared frozen TV dinners.

Despite the increased consumption, Connecticut's production of broccoli has remained constant over the past decade with about 45 acres grown for sale at roadside markets. Virtually none has been produced for supermarkets.

In 1985, however, two supermarket chains expressed interest in locally-produced broccoli for fall consumption. Their interest stems from a policy to purchase locally-produced vegetables when available, which are fresher than those that have gone through the rigors of expensive cross-country shipping.

If the number of acres of broccoli grown are to increase for an expanded market it is highly important to examine the wealth of varieties or cultivars available to American growers to determine those best suited for Connecticut's soil and climate. From more than 60 old and new cultivars available from domestic seed companies I chose 28 for the 1985 trials. To this number I added four experimental cultivars that

had not been tested in Southern New England. This report presents yields, quality, maturity, and disease resistance of cultivars grown in Mt. Carmel and Windsor in the spring and fall of 1985.

SITES AND MANAGEMENT

The broccoli trials were conducted at i) the Valley Laboratory, Windsor, on Merrimac sandy loam, a sandy terrace soil with somewhat limited moisture holding capacity and ii) Lockwood Farm, Mt. Carmel, on Cheshire fine sandy loam, a loamy, upland soil with a moderate moisture holding capacity.

The spring crop was started in a greenhouse with vents opened at 72 F and heated to maintain a temperature of at least 50 F. The seedlings were moved to a cold frame for hardening and then planted in the field. The fall crop was started in an outdoor lath enclosure providing 50% shading and planted in the field when seedlings were 4 inches high. The seedlings were grown in Promix B in standard plastic pots measuring 2 5/8" x 2 1/4" x 2 5/16" and held in packs of 36. About 4 weeks after germination, water-soluble 20-20-20 fertilizer was added to the seedlings. The seedlings were planted in rows 36 inches apart with spacing 18" within rows to provide a density of 9680 plants/A. Each planting consisted of five randomized blocks with six plants/cultivar in each replication. Transplanted seedlings dying the first week were replaced. Mature heads were harvested at 2- or 3-day intervals. Yields were weighed, and quality was judged by color, evenness and compactness of head, excessive stalkiness and leaves protruding from the head.

The details of management of the soil and crop

Table 1. Soil and crop management of broccoli and pertinent dates.

Activity	Spring Crop	Fall Crop
Soil fertilization (Rates based on soil tests)		
10-10-10	1300 lbs/A	1300 lbs/A
lime (Mt. Carmel)	3250 lbs/A	3250 lbs/A
lime (Windsor)	None	None
Planting dates		
Seeding in greenhouse or lath house	March 7	June 12
Experimentals & Citation (sown late)	April 2	-
Transfer to cold frame	April 8-10	-
Experimentals & Citation	April 19	-
Transplant seedling to field		
Mt. Carmel	April 19-22	July 25-29
Experimentals & Citation	May 1	-
Windsor	April 23-24	July 23-24
Experimentals & Citation	May 6	-
Pest Control		
Root maggots (Windsor)	Lorsban 4E*	Lorsban 4E*
Root maggots (Mt. Carmel)	Lorsban 4E*	Lorsban 4E*
Cabbage worms	Malathion 50 EC**	Malathion 50 EC**
Irrigation		
Windsor	2	2
Mt. Carmel	1	1
Weed Control		
Cultivations	2	2

* Rate = 1 tbsp(15.8 ml)/5 gal water - 4 oz applied to each plant in planter water.

** Rate = 1 tbsp/gal water.

and pertinent dates are listed in Table 1. The differences in management between trials at Windsor and Mt. Carmel are noted.

YIELD AND QUALITY—SPRING CROP

The average yields were similar at the two locations: at Mt. Carmel 6602 lb/A and 6355 at Windsor, a difference of only 4.2% (Table 2).

At Mt. Carmel Dandy Early, Green Duke and Prominence yielded most, about 6.5 tons/A. At Windsor Green Duke, Mercedes, and Prominence yielded 6 to 7.5 tons/A. At Mt. Carmel Bravo, Green Comet, Green Dwarf, Green Goliath, Mercedes, and the experimental hybrid XPH 5004 yielded over 4 tons/A. At Windsor Dandy Early and Green Dwarf exceeded 4 tons/A.

High yield is not necessarily synonymous with the best quality. Some varieties have pronounced defects that would affect their marketability. Explanations of undesirable characteristics listed in Table 2 follow:

Leggy. The crown is borne on a loosely branched stalk. Heads are normally cut leaving a 5" stalk that is generally shorn of leaves. Cutting a leggy

stalk at 5" would reduce the size of the head because the outermost branches would be severed.

Leafy. Leaves are usually borne on the stalk below the head but extend around and above the head. A leafy head has small to medium sized leaves protruding through the head.

Lumpy. A lumpy head is one in which portions grow faster than others. The uneven surface of a lumpy head is less appealing to the eye. At times depressions in these heads may collect water and become focal points for bacterial and fungal infections.

Buttoning. Buttoning is the maturation of the plant while it is still small. This is caused by vernalization or chilling of the plant in the seedling stage. The head formed on a small plant has only about 1" diameter. The cultivar Futura buttoned in over 95% of the spring planting.

Color. Ideal heads are dark to bluish green. A purplish cast does not detract from its desirability. Pale green, yellowish and reddish colors indicate mineral deficiencies or disease. Brown, black, or water soaked patches indicate disease. Mottled yellow and green patches may be caused by uneven maturation of individual florets.

Table 2. Yield and quality of broccoli at Mt. Carmel and Windsor, Spring 1985.

Cultivar	Mt. Carmel				Windsor				Quality of head
	Heads	Avg.	First	Side	Heads	Avg.	First	Side	
	Hvstd. %	Head lb	Cut lb/A	Cuts lb/A	Hvstd. %	Head lb	Cut lb/A	Cuts lb/A	
Atlantic	87	0.8	6641	2025	83	0.7	5890	2427	Loose and leafy
Bonanza	97	0.6	6023	2614	90	0.7	5753	2615	Compact, small stem
Bravo	100	0.8	8027	2867	97	0.8	7735	4013	Large, leggy, heavy side cuts
Calabrese	90	0.4	3473	1115	97	0.5	4380	1110	Leggy and leafy
Citation	97	0.6	5699		90	0.7	5986		Medium sized, somewhat lumpy, purplish tinge
Cleopatra	57	0.6	3369	6702	83	0.8	6132	4750	Loose, lumpy, poor quality
Dandy Early +	100	1.4	13488	2563	90	1.1	9191	2661	Large, dense, somewhat lumpy, purplish tinge
DeCicco	80	0.6	4372	2820	77	0.5	3791	2744	Leggy and lumpy
Early One	27	1.4	3609	2180	77	0.4	2697	2025	Small, leggy, loose
Futura	3	0.6	178	5362	3	0.3	92	6352	Premature buttoning, heavy side cuts
Galaxy	90	0.6	5552	6536	60	0.7	4329	6124	Good, sometimes lumpy
Gem	93	0.5	4852	3903	73	0.5	3679	4192	Somewhat leggy and lumpy
Goliath	70	0.6	4256	5241	53	0.9	4536	5443	Small, compact
Grande	87	0.8	6748	2573	90	0.9	7732	3021	Large, somewhat leafy
Green Comet	100	1.0	9459	960	97	0.8	7203	1165	Small compact, all matured at once
Green Duke	93	1.4	12725	841	93	1.4	13017	1561	Large, matured at once, sometimes discolored
Green Dwarf +	97	0.9	8013	2917	100	0.9	8782	3193	Ball-type, compact, dense, stalkless
Green Goliath	100	1.0	9828	955	100	0.8	7450	464	Compact, smooth
Green Hornet	73	0.7	4889	4807	87	0.7	5835	5486	Somewhat lumpy, long stems
Green Sprouting	73	0.5	3493	1969	77	0.5	3544	2493	Leggy and leafy
Mercedes +	97	1.0	9357	664	100	1.2	12093	376	Consistently perfect, large compact
Orion +	87	0.7	6250	4652	63	0.7	4590	4309	Good quality
Paragon +	97	0.8	7641	2372	100	0.7	6800	2271	Beautiful semi-large compact, good side cuts
Prominence	100	1.3	12830	2993	97	1.6	14961	2463	Large, tough stem, all matured at once
Southern Comet +	87	0.8	6404	5888	97	0.7	6912	3109	Beautiful
Spartan Early	93	0.7	5927	2333	90	0.6	5212	3455	Small, leggy, lumpy, yellow centers (immature)
Waltham 29	97	0.4	4141	829	80	0.4	3009	836	Small leafy
XPH 853	97	0.6	5677		100	0.6	5943		Small, somewhat leafy
XPH 1127	97	0.8	7244		93	0.8	7015		Medium sized, leafy
XPH 5003	93	0.6	5541		93	0.7	5938		Very uniform, compact, 4-5 inch
XPH 5004 +	100	0.9	8977		87	0.8	6781		Very uniform, compact, 5-7 inch

+ Cultivars produced high quality heads at both Mt. Carmel and Windsor.

Table 3. Yield and quality of broccoli at Mt. Carmel and Windsor, Fall 1985.

Cultivar	Mt. Carmel				Windsor				Quality of head
	Heads	Avg.	First		Heads	Avg.	First	Disease	
	Hvstd. %	Head lb	Cut lb/A		Hvstd. %	Head lb	Cut lb/A	Suscept. #	
Atlantic	90	0.4	3641		90	0.4	3214	S	Small, lumpy and leafy, some rotting in W
Bonanza	100	0.4	4114		100	0.6	5719		Early, small, leggy at W
Bravo	100	0.5	4978		83	0.8	6520	VS	Lumpy, leggy, yellow, much rotting at W
Calabrese	97	0.4	3510		77	0.4	2851		Few primary, much branching
Citation	97	0.5	5090		97	0.7	6462	S	Mostly leafy, some rotting at W
Cleopatra	93	0.7	6557		60	0.7	4365		Leggy, lumpy, some rotting at MC and W
Dandy Early +	97	0.9	8395		97	0.9	8385		Tight, flat, large, some late yellowing
DeCicco	100	0.4	4262		90	0.3	2831		Small, some leafy
Early One	90	0.3	3043		90	0.3	2767	VS	Leafy, leggy, very susceptible to rotting
Futura	100	0.5	4541		100	0.5	5281		Leafy, leggy, small
Galaxy	100	0.6	5534		100	0.8	7569	S	Late yellowing, good sprouts, some rotting at W
Gem	93	0.7	5998		97	0.5	5034		Leafy, leggy, some late yellowing
Goliath	100	0.7	6369		100	0.7	6926	S	Medium, good sprouts, some rotting at W
Grande	97	0.7	6688		93	0.6	5749		Leafy, lumpy, widely variable size
Green Comet	100	0.4	4312		100	0.5	4816		Lumpy, yellow at W
Green Duke	97	1.0	9137		97	0.7	6827	S	Yellowing at W, large compact at MC
Green Dwarf +	100	0.9	8287		97	0.6	5916		Ball-type, compact, stalkless, some late yellowing
Green Goliath	90	0.5	4225		100	0.7	6599		Large, leggy at W, smaller, compact at MC
Green Hornet	100	0.7	6596		97	0.7	7068		Early heads small, some leggy and yellow
Green Sprouting	90	0.4	3554		90	0.4	3471		Leggy and leafy
Mercedes	93	1.5	13624		83	2.0	16794		Large branching, internal browning at W
Orion	97	0.7	6405		97	0.7	6634		Leggy, leafy, small, some yellowing
Paragon	97	0.5	4416		87	0.8	6987		Somewhat lumpy, leggy, some yellowing
Premium Crop	87	0.8	6879		97	0.7	6888	VS	Medium, good sprouts, some rotting at W
Prominence +	100	0.9	9149		93	0.8	7363		Large compact, some late yellowing at W
Southern Comet	100	0.6	6034		93	0.7	6600	S	Variable shape and size, some rotting at W
Waltham 29	100	0.4	3551		67	0.2	1555		Few primary, much branching
XPH 853	100	0.5	5052		97	0.5	5028		Leafy, small
XPH 1127	97	0.6	5288		97	0.5	4782		Leafy, somewhat lumpy
XPH 5003 +	100	0.9	8870		100	1.0	9416		Very uniform, compact 6-7 inch, good sprouts
XPH 5004 +	100	0.5	4450		100	0.9	8685		Compact, medium, good sprouts

+ Cultivars produced high quality heads at both Mt. Carmel (MC) and Windsor (W).

S = susceptible to downy mildew and bacterial rot VS = very susceptible

Table 2 contains the most prominent characteristics of each cultivar. Mercedes was judged to have the best quality. The 6 to 8" diameter heads were consistently perfect and weighed over 1 lb. Paragon was judged second best with 6 to 7" diameter heads weighing about 3/4 lb. Other cultivars judged to be excellent quality were Dandy Early, Green Dwarf, Orion, Southern Comet, and the experimental hybrid XPH 5004. The late maturing heads of Dandy Early tended to be somewhat lumpy with a purplish tinge. Green Dwarf had a 5 to 6" compact, ball-shaped head borne on a short stalk and averaged a little less than 1 lb. Southern Comet heads were 5 to 6" in diameter, compact and averaged 3/4 lb. Orion had compact 5" heads weighing a little less than 3/4 lb. The experimental cultivar XPH 5004 had uniform, compact 5 to 7" heads averaging a little less than 1 lb. These cultivars performed similarly at both Mt. Carmel and Windsor. The remaining cultivars did not produce consistently high quality heads at either site.

Secondary heads form on branches developing from the main stalk after the primary head has been cut. Their harvest is called "side cutting". Side cuts were harvested for 4 weeks following harvest of the primary head. Only sprouts at least 3" in diameter were harvested. The stalks were sufficiently long to bunch together for sale. Because Citation and the experimental cultivars were planted late, side cuts were not harvested. Futura produced the most side cuts. After the buttoned heads were severed the small plants produced many large side branches, some with 5" diameter heads. Bravo and Paragon produced excellent side cuts. Cleopatra, Galaxy and Green Hornet also produced abundant side cuts, but these heads suffered the same defects as the primary heads.

YIELD AND QUALITY—FALL CROP

The average yields at Mt. Carmel and Windsor were again similar. The average yield per cultivar at Windsor was 5909 lb/A compared to 5705 lb/A at Mt. Carmel, a 3.5% difference (Table 3). Compared to the spring yield, the fall yields were 14% lower for Mt. Carmel and 7% less for Windsor.

Mercedes produced most, 8.4 tons/A at Windsor and 6.8 tons/A at Mt. Carmel. Although the yields were high, the tight, compact heads of spring were absent. Although many large fall heads of Mercedes exceeded 2 lb, rampant growth produced loosely branched, lumpy heads that did not appeal to the eye.

At Windsor, Dandy Early and the experimentals, XPH 5003, and XPH 5004, yielded more than 4 tons/A. At Mt. Carmel, Dandy Early, Green Duke, Green Dwarf, Prominence and the experimental XPH 5003 also exceeded 4 tons/A.

Dandy Early, Green Dwarf, Prominence and the experimentals XPH 5003 and XPH 5004 produced compact heads with excellent deep green color. At Windsor the late maturing heads of Dandy Early had a yellowish tinge that was not observed in early maturing heads. Heads of Dandy Early were not yellowed at Mt. Carmel. Green Duke, with high yield of excellent quality at Mt. Carmel, had excessive yellowing at Windsor. Green Dwarf, with a ball-type head borne on a short stalk, and Prominence and the experimentals XPH 5003 and XPH 5004 produced excellent quality, compact heads with deep green color. Green Hornet produced excellent medium sized heads at Windsor and Mt. Carmel, but yielded only 3 to 3.5 tons/A. The remainder of the cultivars had low yield, had inconsistent quality, or were susceptible to downy mildew and bacterial rot.

MATURITY

An important characteristic of any vegetable crop is the length of time to produce a mature plant from seed or transplanting. This information is required to determine when to plant in order to harvest at a given time. The days to maturity for broccoli may be stated as the number of days from seeding to maturity or from transplanting seedlings to maturity. In Table 4, the days to maturity were calculated from the day of transplanting to the day when half the heads were harvested; i.e. the harvest date of the 15th head from a population of 30 plants.

Maturity among the 32 cultivars planted varied from 48 to 62 days at both sites for the spring crop and from 45 to 94 days at both sites for the fall crop. The apparent increase in time to maturity for the fall crop is due entirely to the sprouting cultivars of Calabrese, DeCicco, Green Sprouting, and Waltham 29. Most hybrid cultivars had maturities that were relatively constant between sites for both spring and fall crops, as expected. The only exception was Orion, an excellent spring producer, whose fall performance was rather poor and accompanied by about 12 days longer to maturity. Futura's early spring maturity was caused by vernalization of seedlings in the cold frame with subsequent rapid production of "buttons".

Another important facet of maturity is the span of harvest or the days between the harvest of the first and last marketable heads. For mechanical harvests of broccoli for processing and freezing, short spans are highly desirable. Thus, the spring crops of Green Comet, Green Duke, Mercedes, Prominence, and the experimentals XPH 1127 and XPH 5003 with spans of 7 days or less would be desirable for mechanical or single harvests by hand. Similarly, fall crops would be limited to Green Duke,

Table 4. Maturity of broccoli at Mt. Carmel and Windsor, Spring and Fall 1985.

Cultivar	Mt. Carmel				Windsor			
	Harvest Midpoint		Harvest Span		Harvest Midpoint		Harvest Span	
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
	Days*		Days**		Days*		Days**	
Atlantic	60	60	27	18	62	62	26	19
Bonanza	56	50	20	9	58	51	9	4
Bravo	53	47	11	12	55	50	15	15
Calabrese	60	85	20	35	61	75	30	35
Citation	57	60	19	16	52	61	11	34
Cleopatra	50	54	24	14	55	55	19	22
Dandy Early	56	52	21	23	55	53	12	13
DeCicco	57	70	33	35	57	68	16	41
Early One	56	58	11	12	55	57	18	19
Futura	30	63	7	16	29	62	7	18
Galaxy	48	50	9	9	50	49	15	9
Gem	48	60	17	27	51	56	15	15
Goliath	51	45	17	13	54	49	15	22
Grande	56	60	27	34	58	62	22	36
Green Comet	59	56	7	25	61	50	10	20
Green Duke	57	54	7	4	62	52	7	7
Green Dwarf	60	58	14	7	55	57	14	15
Green Goliath	60	58	11	11	62	50	13	9
Green Hornet	51	54	17	23	51	52	12	22
Green Sprouting	57	70	21	41	55	70	22	43
Mercedes	56	52	4	9	58	59	9	4
Orion	48	59	20	30	51	63	26	27
Paragon	53	47	11	9	54	49	13	4
Premium Crop		56		9		52		20
Prominence	59	54	7	9	62	55	7	3
Southern Comet	54	50	24	12	55	51	15	15
Spartan Early	56		9		55		9	
Waltham 29	64	81	21	21	61	94	18	21
XPH 853	58	59	19	31	56	62	13	20
XPH 1127	55	54	7	9	52	55	11	7
XPH 5003	48	47	7	2	49	47	7	2
XPH 5004	51	45	10	2	49	50	7	7

* Time from transplanting to midpoint of harvest.

** Time from start to finish of harvest of primary heads.

Mercedes, Paragon, Prominence and the experimentals, XPH 1127, XPH 5003 and XPH 5004.

For other hybrids the harvest span was generally from 7 to 25 days, and these would be suited for repeated harvests. The primary heads of the sprouting cultivars, Calabrese, DeCicco and Green Sprouting were harvested over 4 to 5 weeks, which would be desirable for home gardeners seeking a steady supply for the table.

WEATHER

During the growing period for the 1985 spring crop precipitation was above average and temperature below average. In the past (Brumbach, 1965) about 7.5 inches of rain fell during May and June. At

Windsor 8.2 inches were recorded and at Mt. Carmel, 8.7. For crops, temperature is usually measured in growing degree days. (Daily average temperature-base 40 F). Past records (Dethier & Vittum, 1963) indicate 1650 degree days expected for the growing period. Windsor experienced 1487 degree days and Mt. Carmel, 1393. Broccoli, a cool weather crop, was probably favored by these lower temperatures. The spring crop was not under moisture stress at any time during its development because one to two irrigations were provided in the early stages of growth of the newly planted seedlings.

During growth of the 1985 fall crop, precipitation was above average and temperature was normal. In the past 10.8" fell at Windsor and 12.1" at Mt. Carmel from June 25 to Oct. 28. During the 1985

period of crop growth, 13.8" fell at Windsor and 13.2" at Mt. Carmel.

Past weather records indicate that 2284 growing degree days may be expected during the fall season. In 1985, 2287 degree days were recorded at Windsor and 2295 at Mt. Carmel, both close to normal.

There were severe disparities, however, in distribution between the two stations during this period. From August 1 to 11, 4.7" of rain fell in three thunderstorms at Windsor, while only 1.1" fell at Mt. Carmel.

DEVELOPMENT OF DISEASE

Abnormal weather in early August in the upper Connecticut Valley favored development of disease on broccoli that did not appear in Southern portions of the state where weather was normal. The 4.7" of rain in early August at Windsor soaked the plants and ground for a prolonged time. Dry air masses did not appear during this period. This rainy period was followed by 3 days of 92 F daytime temperatures with warm nights. These conditions favored downy mildew and bacterial soft-rot, which damaged broccoli in the upper Connecticut Valley. The southern portion of the state received only 1.1" of rain during this period and disease was minimal. The symptoms of the diseases were brownish lesions on leaves and a water soaked appearance of developing heads. Soft rot bacteria completely decimated some plants, while others displayed brown to black patches on the heads after the crop finally dried.

In my trials, disease seemed to be confined to those cultivars that produced the uneven heads described as "lumpy". Depressions in the uneven heads collected morning dew and rain. Symptoms were generally in these depressions. Plants with uniform heads seldom became diseased. Less than 10% of the fall crop at Windsor was diseased and less than 1% at Mt. Carmel. I list the cultivars and their susceptibility to downy mildew and soft rot:

- Very susceptible (more than 10%): Cleopatra, Early One, Premium Crop
- Susceptible (less than 10%): Atlantic, Bravo, Citation, Galaxy, Green Duke, Goliath, Southern Comet

All other cultivars were free of disease at both Windsor and Mt. Carmel.

STRATEGIES FOR CONNECTICUT

The 1985 cultivar trials demonstrate that broccoli of commercial quality can be produced in Connecticut for harvest from early June through July 1st and early September through late October. The

spring harvest was shorter than the fall harvest because of the onset of hot weather in July. Production was accomplished with transplanted seedlings set out in a single planting about April 20th for the spring crop and around July 25th for the fall crop. The use of only one or two cultivars may increase risk of crop failure. For example, the unusual fall weather of 1985 favored downy mildew and bacterial rot, which lowered anticipated yields of certain cultivars. The use of cultivars that can withstand these diseases would seem prudent even though the disease problem was confined to the upper Connecticut Valley and did not develop on broccoli in southern portions of the state. The cultivars that I judged best in the trials were not affected by disease.

My results suggest that a desirable span of harvest may be accomplished in three ways:

1. Plant cultivars that mature over a broad span of time.
2. Plant cultivars with varying maturity.
3. Plant cultivars with short spans of maturity in several plantings at weekly intervals.

Plan 1 can be accomplished with as few as two plantings, perhaps 3 weeks apart. For example, the spring planting of Dandy Early, Orion, and Southern Comet on April 20 provided a 3-week harvest span from June 7 to June 28. After June 21 the harvest diminished. A second planting on April 26 to 28 would have filled in the last 10 days of June, but again the harvest would have diminished rapidly in early July with the onset of hot weather. Planting earlier than April 20 would probably cause a higher percentage of "buttoning". The fall planting of Dandy Early, Goliath, Green Dwarf, Green Hornet, Prominence and the experimentals XPH 5003 or XPH 5004 on July 25th provided a nearly 3-week harvest from September 10 to 29. A second planting 3 weeks after the first would be harvested in October to early November.

Plan 2 could be accomplished using cultivars whose maturities differ, but whose harvest span is short. For the spring crop, early and medium maturing Paragon, Mercedes, and Green Dwarf with short harvest spans coupled with early maturing Dandy Early with a long harvest span provided a 3-week harvest span from June 5 to June 27. The harvest diminished after June 24. A second planting on April 26 to 28 would have filled in the last week of June. For the fall crop, experimental XPH 5003 yielded on September 10 to 14, a short span. Green Dwarf yielded September 19 to 27, a 7-day span. A 6-week harvest period would require three plantings of each cultivar at 10 to 14 day intervals.

Under plan 3, single cultivars could be grown in several plantings. For the spring crop, Mercedes with a short harvest span of 4 to 9 days yielded from

June 12 to 16 at Mt. Carmel and June 13 to 24 at Windsor. Three plantings one week apart starting April 20 would be required for a June harvest. For Green Dwarf, a later maturing, longer span variety, two plantings would suffice. The harvest of Dandy Early began June 5 to 7. Its long span of harvest would require a second planting about 14 days after the first. For the fall the experimentals XPH 5003 and XPH 5004 were harvested September 9 to 14. Six plantings would be required at weekly intervals starting about July 20 to fill a harvest from early September through October. Cultivars like Dandy Early harvested September 11 to 29, Goliath harvested September 9 to 24, and Green Hornet harvested September 9 to 26, would need a second planting 2 to 3 weeks after the first.

Plan 1 seems to offer a long harvest span with

fewest plantings and provides diversity against the possible ravages of disease.

REFERENCES

1. Brumbach, J. J. 1965. Climate of Connecticut. Conn. Geol. and Nat. Hist. Sur. Bull. 99. 215 pp.
2. Dethier, B. E. and M. T. Vittum. 1963. Growing Degree Days. New York Agr. Expt. Sta. Geneva. Bull. 801. 84 pp.

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