Scheduling Collard Planting Dates Regionally to Lengthen the Production Period

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Summary. The experiment screened two spring and two fall planting dates in six regions within North Carolina, South Carolina, and Georgia. The objective was to extend the production over the southeastern United States rather than at a single location. Spring harvests lasted from mid-April to early July. Summer-to-winter harvests lasted from mid-August to late January. Collards were not harvested in any of the locations from late January to mid-April or from early July to mid-August. More extensive planting dates may further increase the longevity of production.

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Recently, viability of agriculture in the southeastern United States has declined. Most farms in the southeastern United States are less than 165 ha in size, and these small farms need profitable alternatives. Continued survival of smaller family farms depends on the extent to which they adapt and compete economically.

Greens, such as collards, are an important crop in the southeastern United States. A major barrier to their marketing is the inability of individual producers to provide sufficient volume ofproduct for a reasonable period of time (Epperson, 1982). The price structure for collards at South Carolina farmers' sheds in 1990 was stable and remained in the range of $7 to $9 per 12 bunches (0.3 to 0.5 kg/bunch) from 6 Feb. to 18 Dec. (Federal-State Market News Service, 1990). This price does not represent a barrier to marketing. A cooperative effort within the southeastern United States to produce collards over most of the year would strengthen the marketing ability more than multiple plantings in a single location.

The first step in developing a successful production system is the identification of cultivars and specific planting schedules for representative regions within the southeastern United States. Thus, the objective of this study was to determine the suitability of selected collard cultivars, spring and fall planting dates, and potential harvest periods at seven regions within Georgia, North Carolina, and South Carolina.

Seven locations were chosen to represent distinct regions within the southeastern United States. They vary in climate from conditions similar to northern Florida (Attapulgus, Ga.) to those with a comparatively short growing season (Fletcher, N.C.) (Fig. 1). Climatic diversity may allow collard production over most of the year. The locations and general descriptions were as follows: a) Mountain Horticultural Research Station, Fletcher, N.C.—southern Appalachian Mountains; b) Peanut Belt Research Station, Lewiston, N.C.—tidewater coastal plain; c) Clemson Bottoms Research Site, Clemson, S.C.—upper Piedmont; d) Pee Dee Agricultural Research and Extension Center, Florence, S.C.—central upper coastal plain; e) Coastal Research and Education Center, Charleston, S.C.—lower eastern coastal plain; f) Coastal Plain Experiment Station, Plains, Ga.—central western coastal plain; and g) Georgia Extension and Research Station, Attapulgus, Ga.—lower southwestern coastal plain. Two spring and two fall planting dates were chosen for each location (Fig. 2). The first spring and last fall planting dates were considered to be the earliest and latest practical dates, respectively, for planting in each specific location. The second spring and first fall planting dates generally were considered to be safe dates for successful planting.

'Champion', 'Georgia', 'Heavicrop', and 'Vates were chosen based on commercial recommendations (Graham and Cook, 1984). Individual plots were 6.1 m long with beds spaced 1.8 m apart, measured from the centers of each bed. Three rows of transplants were spaced 38 cm apart on each bed, and ≈ 20 cm separated each plant within the rows. A Latin square design with four replications was used. Standard commercial production practices for each location were based on local extension recommendations. Collards were harvested when plants produced at least 18 to 20 leaves. Total marketable weight and number of plants were recorded in each plot. Data were analyzed by analysis of variance; means were separated with least significant difference at $P = 0.05$ if the F test was significant.

Generally, the cultivars yielded similarly, and no planting date or cultivar was consistently superior to any other. Yields, averaged over all culitvars, planting dates, and years, were greatest in the more northern locations in the southern Appalachian Mountains, tidewater coastal plains, and the upper Piedmont and lowest in the central

Fig. 1. ***Locations of collard adaptation research in the southeastern United States.***

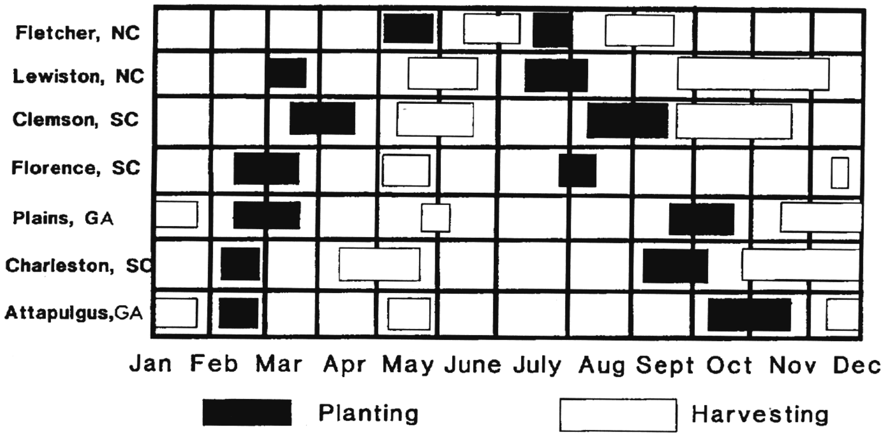

Fig. **2.** ***Sequence of collard planting and harvesting in seven southeastern locations within the United States based on 1985-87 production studies using selected planting dates.***

coastal plains and lower coastal plains (Table 1). Temperatures in the more northern regions tended to be warmer during the growing season than the southern regions (Table 2). Since the planting dates in the southern regions were earlier than the northern regions, collards were generally exposed to cooler temperatures during the growing seasons. In previous work, Dufault et al. (1989) reported that higher mean, minimum, and maximum air temperatures in the more northern regions during 1985 to 1987 may have increased growth rates and biomass production. The optimal temperature for collards was estimated by Lorenz and Maynard (1988) to be from 15.5 to 18.3C. Dufault et al. (1989) suggested a formula for calculating heat unit summations for collards using 13.4C as the base temperature [rather than a 4.4C base, considered the minimum temperature for growth (Lorenz and Maynard, 1988)] and a maximum temperature of 23.9C. Therefore, they concluded that collards require higher rather than lower temperatures for optimal growth during the growing season.

Although yields were' higher in some of the northern regions compared to more southern regions of the southeastern United States, collards can be produced in one of the regions during most of the year. Figure 2 illustrates the range of dates for planting and harvest.

Spring harvests in one of the seven locations occurred continuously over an 11 -week period from mid-April to early July (Fig. 2). Harvests began in the lower coastal areas, moved into the central coastal plains, and terminated in the upland and mountain regions. Planting of collards in spring began as early as February in the lower coastal plain and the lower southwestern coastal plain and terminated in the southern Appalachian Mountains as late as mid-May. The earliest spring harvests began in the lower coastal plain in mid-April to late May. Although only two spring planting dates were screened each year in each region, it is probable that planting dates after the last spring date and before fall dates would extend the span of harvests even more.

The planting of fall collards began as early as mid- July to early August in the southern Appalachian Mountains and the tidewater coastal plain, respectively (Fig. 2). The latest plantings were made in the central western coastal plain (late September to late October) and lower southwestern coastal plain (early October to late November). Collectively, fall harvest in the region lasted ≈ 5.5 months. Harvest began in mid-August in the mountains, the uplands, and northern locations and ended in late January in the central and southern coastal locations. Since only one fall planting occurred in the central upper coastal plain (Clemson location), prediction of the length of harvest is not possible.

Table *1.* ***Production of collards in seven locations in the southeastern United States from 1985 to 1987.***

Location	Area represented	Yield ($t\cdot ha^{-1}$)
Fletcher, N.C.	Southern Appalachian Mountains	38.8 a[y]
Lewiston, N.C.	Tidewater coastal plain	36.7 a
Clemson, S.C.	Upper Piedmont	33.2 ab
Florence, S.C.	Central upper coastal plain	27.9 b
Plains, Ga.	Central western coastal plain	22.8 c
Charleston, S.C.	Lower eastern coastal plain	24.6 c
Attapulgus, Ga.	Lower southern coastal plain	28.1 b

[z]*Pooled averages of 'Champion', 'Georgia', 'Heavicrop', and 'Vates' grown as spring and fall crops.*
[y]*Means separated by least significant difference,* P = *0.05.*

Table *2.* ***Mean air temperatures at seven locations in North Carolina, South Carolina, and Georgia for the 1985 to 1987growing seasons.***[z]

Location	Temp (°C)[y]		
	Mean[x]	Max[w]	Min[v]
Fletcher, N.C.	20.0 a	26.4 a	13.5 a
Lewiston, N.C.	18.8 a	25.4 b	12.3 bc
Clemson, S.C.	18.2 b	24.6 b	11.9 c
Florence, S.C.	16.7 d	23.2 c	10.1 e
Plains, Ga.	17.0 cd	23.1 c	11.0 d
Charleston, S.C.	17.8 c	23.3 c	12.4 bc
Attapulgus, Ga.	15.6 e	20.8 d	10.7 d

[z]*Mean data for entire growing period from planting to harvest. All means were calculated from 1985 to 1987 growing seasons, except at Attapulgus (1986 and 1987 only) and Florence (1986 and 1987 only).*
[y]*Mean separation within columns by least significant difference,* P = *0.05.*
[x]*Overall mean temperature for the growing period.*
[w]*Mean of daily maximum temperatures for the growing period.*
[v]*Mean of daily minimum temperatures for the growing period.*

The length of collard production in the southeastern regions tested was limited because of the planting dates selected. Collards were not produced for ≈ 11 weeks from late winter to early spring and for 6 weeks in the summer. Further work is needed to determine if earlier and later planting dates would extend the production season to fill in those gaps.

This study demonstrated that the wide range of environmental conditions present in Georgia and the Carolinas allows production of collards during most of the year. Thus, if cooperative marketing can be developed to "hold" the markets longer, the southeastern production location could be shifted throughout many regions. This research indicates that, if growers and buyers from the southeastern United States cooperate, pool resources, and develop regional plantings, their position in the collard market could be strengthened.

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