

# Relay Intercropping Brassicas into Chile and Sweet Corn

Guide A-609

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Intercropping is a type of multiple cropping system in which two or more crops are grown simultaneously on the same field. Relay intercropping is the production of a second crop planted into a field when the first crop has reached its reproductive stage but before physiological maturity. Thus, crops of different species can be grown during one season in production areas where the growing season is too short for double cropping.

Because forage brassicas are frost-tolerant, they are potentially useful as a second crop in the high-desert regions of the southwestern United States. Relay intercropping brassicas in frost-sensitive crops (such as chile and sweet corn) should produce two crops per year and possibly improve total yield per acre. In addition, forage brassicas have high yields, protein content, and digestibility.

Brassicas that have been grown as forages include kale, radish, rape (canola), and turnip. However, little research has been done on relay intercropping brassicas into chile and sweet corn. The objectives of this study were to determine the effects of intercropping four brassicas on the yields of chile and sweet corn in a high-desert region of north-central New Mexico.

## BACKGROUND

The Alcalde Sustainable Agriculture Science Center is located about 5 miles north of Española, NM and has an elevation of about 5,700 ft. Soils in the production area are classified as Fruitland sandy loam. Insect and weed control and nutrient management recommendations for optimum production for north-central New Mexico were followed. All crops were furrow irrigated as needed during the season.

Chile and sweet corn plant populations were similar to commercial fields in the area. Four forage brassicas (Sparta rape, Premier kale, and Forage Star and Rondo turnips) were interseeded into New Mexico 6-4 chile

and NK 199 sweet corn during the 1993–1995 growing seasons. The chile and sweet corn fields were interseeded at rates of 8 lb/acre for rape and kale seed and 4 lb/acre for turnip seed. Interseeding was done on two dates, one early and one late. In the corn field, early interseeding was at the V7–V9 growth stage and late interseeding occurred at the blister stage. In the chile field, early interseeding occurred when the chile was between 12 inch and 16 inch tall and late interseeding was about two weeks thereafter.

Green chile were harvested from Sept. 17–Oct. 11. Sweet corn was harvested at about the milk stage (Aug. 12–Sept. 3), then the stalks were cut and removed. Brassicas were harvested about 60 days after the first crop (Nov. 9–Nov. 16). Turnip yields include roots and tops.

A split-plot experiment in a randomized complete-block design with four replicates was used. The main plots were two interseeding dates, and the sub-plots were the four brassica species and a non-seeded control. Effects of brassica forage and interseeding date on chile and sweet corn yields were determined according to the general linear model procedure of the Statistical Analysis System (SAS). Differences between means were separated by the Duncan Multiple Range Test (DMRT) at the 0.05 probability level.

## YIELD RESULTS

### Brassicas Interseeded into Sweet Corn

Intercropping systems are generally evaluated on land equivalent ratio, which is the ratio of intercrop yields to individual crop yields of each component crop. In these studies, neither the interseeding dates nor the particular brassica species lowered corn yields compared with corn grown as the sole crop.

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Early interseeding the brassicas resulted in significantly higher forage yields compared with late interseeding (Table 1). The highest yielding forage was Rondo turnip at 6,040 lb/acre, followed by Forage Star turnip at 4,685 lb/acre. However, significant interseeding date x forage and year x forage interactions were detected. These results do, however, show that turnips have greater forage yield potential than kale and rape.

### Brassicas Interseeded into Chile

Early interseeding the brassicas resulted in significantly higher forage yields compared with the late plantings (Table 2). The highest yielding forage was Forage Star turnip at 1,700 lb/acre, followed by Rondo turnip at 1,160 lb/acre. These results show that turnips have greater forage yield potential than kale and rape.

**Table 1. Forage brassica yield interseeded at two dates into sweet corn in 1993 and 1994.**

Forage brassica	-----Interseeding date-----				Brassica mean
	1993		1994		
	Early	Late	Early	Late	
-----Total dry matter (pound per acre)-----					
Premier kale	720 b*	500 a	3,400 c	3,260 b	1,970
Sparta rape	1,920 a b	1,220 a	3,700 c	2,640 b	2,370
Rondo turnips	3,980 a	1,560 a	11,240 a	7,380 a	6,040
Forage Star turnips	2,760 a b	1,060 a	7,020 b	7,900 a	4,685
Date mean	2,345	1,085	6,340	5,295	

\*Means within columns followed by the same letter are not significantly different by Duncan's MRT at  $P \leq 0.05$ .

**Table 2. Forage brassica yield interseeded at two dates into chile in 1993, 1994, and 1995.**

Forage brassica	-----Interseeding date-----						Brassica mean
	1993		1994		1995		
	Early	Late	Early	Late	Early	Late	
	-----Total dry matter (pound per acre)-----						
Premier kale	1310 a *	1070 a	870 b	770 b	1010 a	160 a	865
Sparta rape	1290 a	380 a	1010 b	130 b	1390 a	210 a	735
Rondo turnip	2240 a	1140 a	1680 a	500 b	1270 a	140 a	1160
Forage Star turnip	2830 a	730 a	2040 a	1830 a	2660 a	110 a	1700
Date mean	1920	830	1400	810	1580	150	

\*Means within columns followed by the same letter are not significantly different by Duncan's MRT at  $P \leq 0.05$ .

## RECOMMENDATIONS

The most consistent forages, under all conditions, were the two turnip varieties (Rondo and Forage Star). In the Alcalde production area and other areas with similar growing conditions, interseeded turnips have more potential for producing forage for fall grazing. Based on these results, interseeding turnips into chile and sweet corn warrants further investigation in terms of animal response to grazing.

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