

Introduction

- Goals:
- 1) Review the experiment set-up
 - 2) Bring up-to-date on results from the basic experiment
 - 3) What appetites for results to be presented later

Set-up of experiment

Distribution of installations

Average characteristics

2nd growth, even-aged, managed stands of DF
Sampled across range of tree size, density, age
and site condition (3rd Annual Report April 1993)

		<u>x</u>
Age	27 to 100	65
BA	48 to 272	142
DBH	5.8 to 15.3	10.3
Site Index	37.1 to 108.0	69.7
% DF		87.5

Plot set-up

Date measurement

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Second section of handwritten notes.

Third section of handwritten notes.

Fourth section of handwritten notes.

201	201 of 75	201
202	202 of 80	202
203	203 of 85	203
204	204 of 90	204
205	205 of 95	205

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Design Model 1

Effects related to growth vs. those related to treatment

Treatment differences

Regional differences

BAE (A^2/A) at 150 A^2/A BA

BA differences

C Idaho, N Idaho, NE Oregon - moderate differences
from 200 to 400

Montana, NE West - slight differences
from 200 to 400

Can West - significant differences from 200 to 400

Growth differences

BA trends

Overall ↑ , 1981 decreasing at higher BA
1982 flat across years

Year - differences vary by region

Can West - 1982 > 1981

NE West - 1982 = 1981

Montana 1982 < 1981

DESIGN MODEL 1

LN (BAI) =

F (YEAR , REGION , YEAR x REGION,

INSTALLATION (YEAR REGION)

BLOCK (YEAR REGION INSTALLATION)

TREATMENT

REGION x TREATMENT

BA BA x TREATMENT BA x YEAR

BA² BA² x TREATMENT BA² x YEAR)

R² = 0.9025

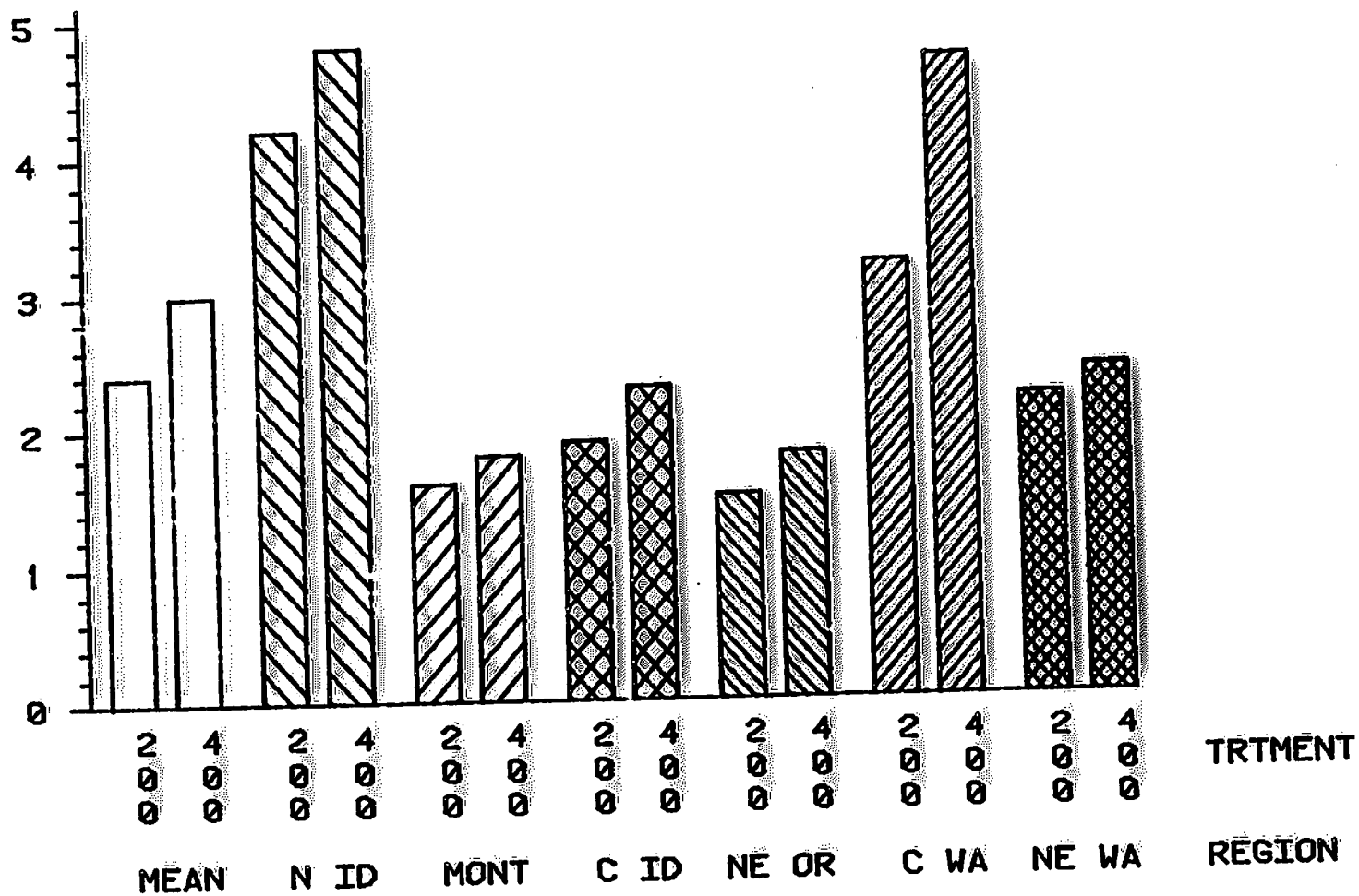
MSE = 0.0243

CV = 6.86%

BAI INCREASE OVER CONTROL

BY TREATMENT AND REGION

RESPONSE

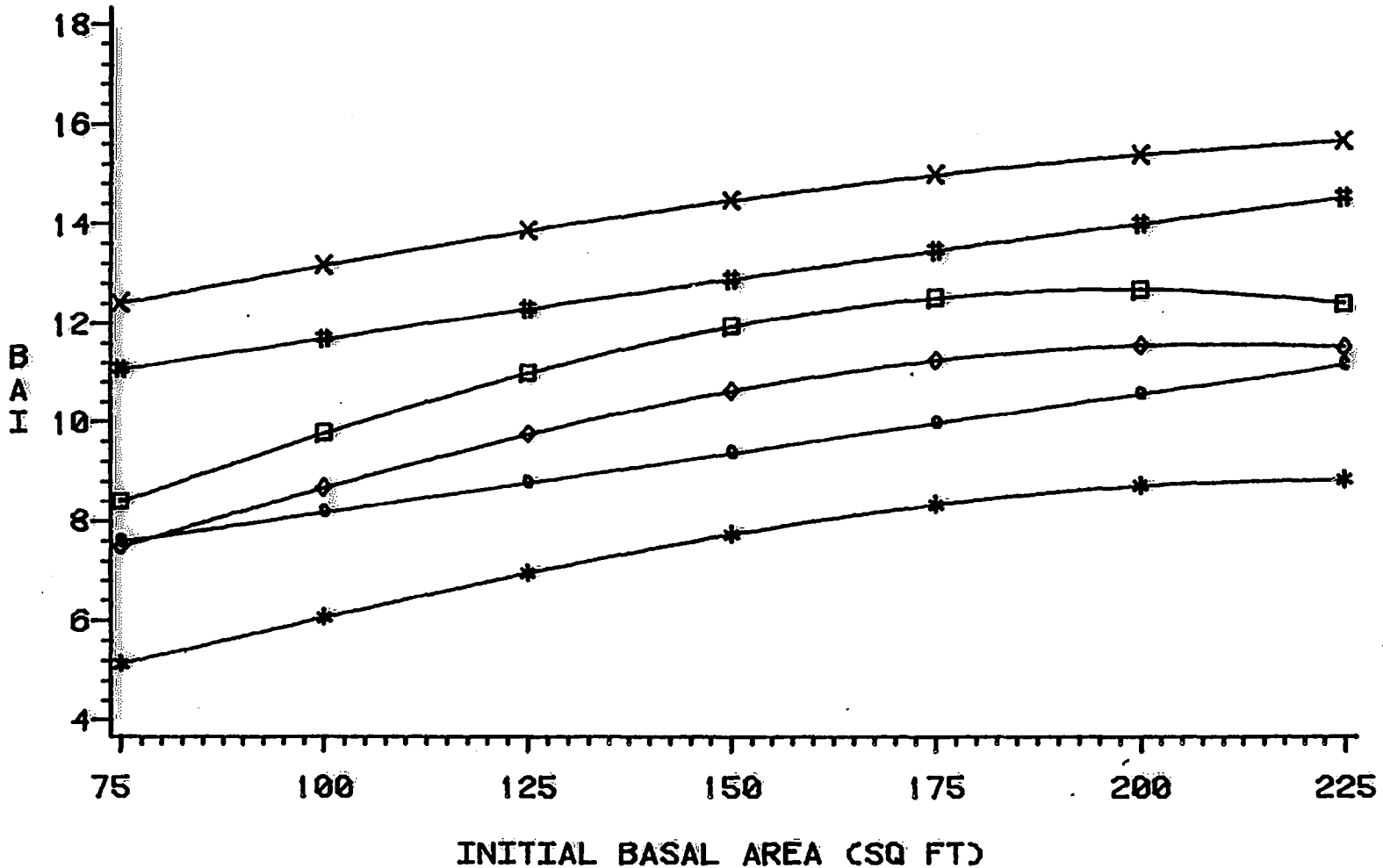


Design Model
with Region & trt
BD & trt

Absolute response
by region, year

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=CEN WASHINGTON



LEGEND: YEAR_TRT

--* 1981, CONTROL

◇-◇-◇ 1981, 200 LBS

□-□-□ 1981, 400 LBS

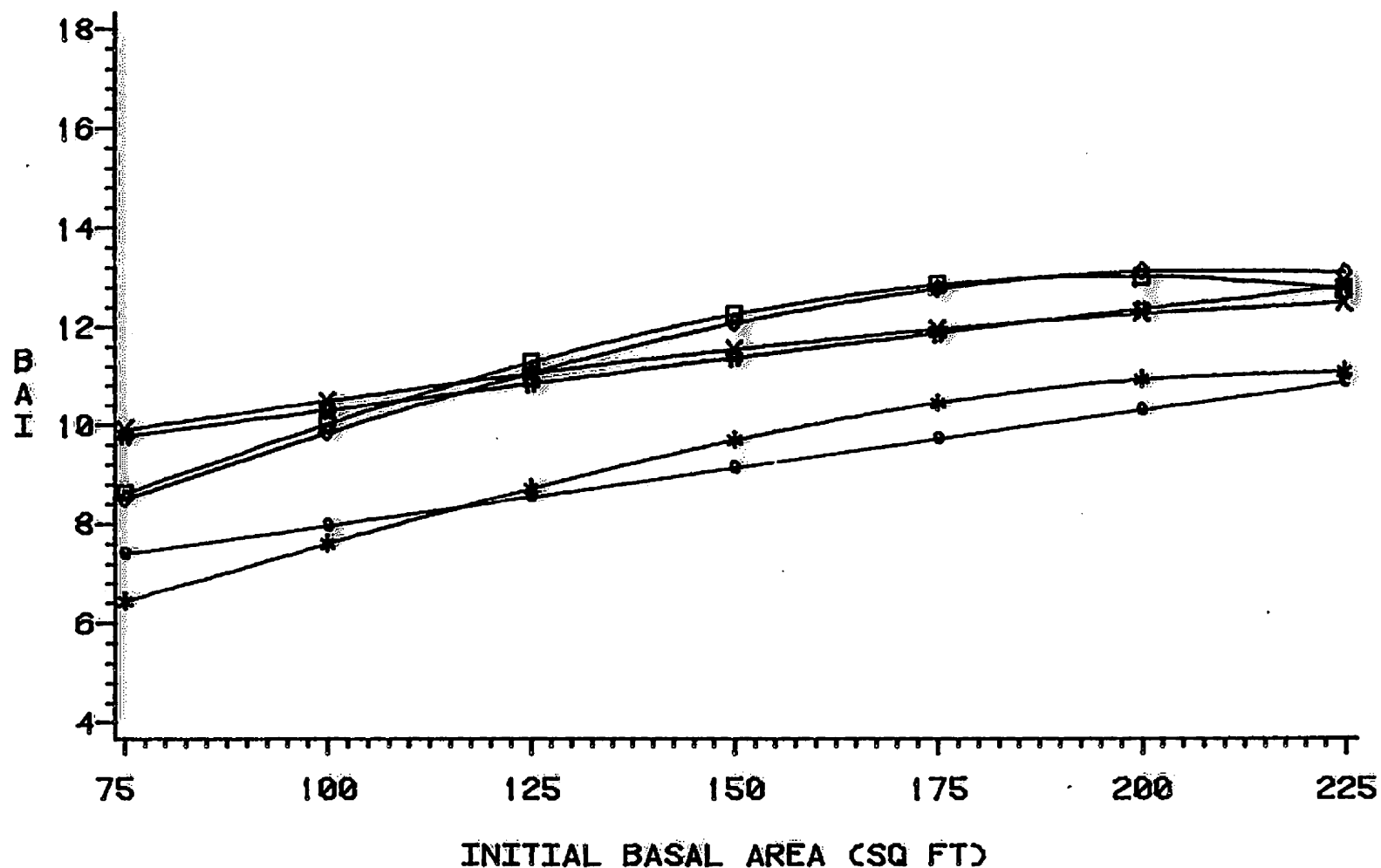
●-●-● 1982, CONTROL

#-#-# 1982, 200 LBS

x-x-x 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NE WASHINGTON



LEGEND: YEAR_TRT

--* 1981, CONTROL

□-□-□ 1981, 400 LBS

#-#-# 1982, 200 LBS

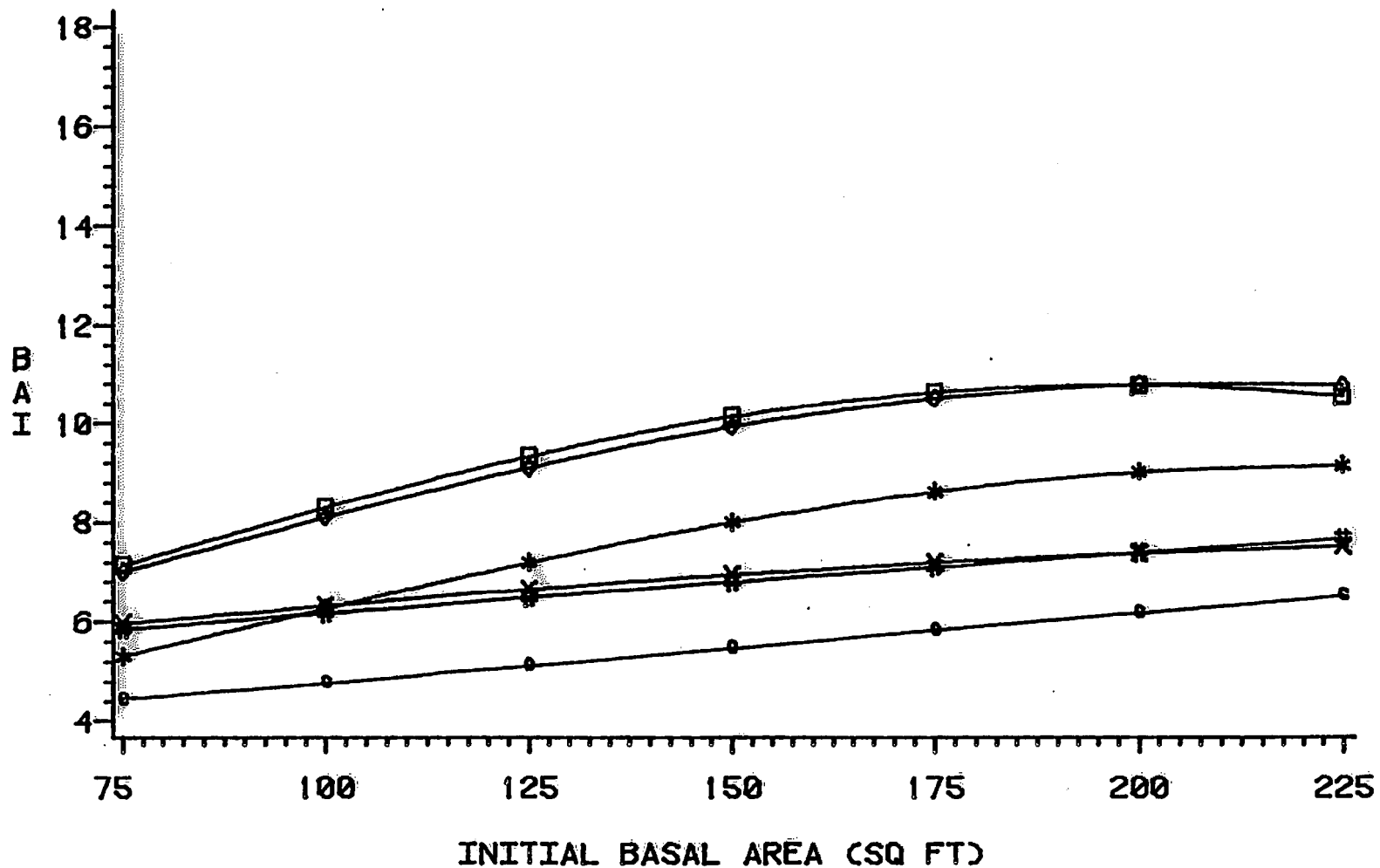
◇-◇-◇ 1981, 200 LBS

○-○-○ 1982, CONTROL

--* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=MONTANA



LEGEND: YEAR_TRT

--* 1981, CONTROL

□-□-□ 1981, 400 LBS

#-#-# 1982, 200 LBS

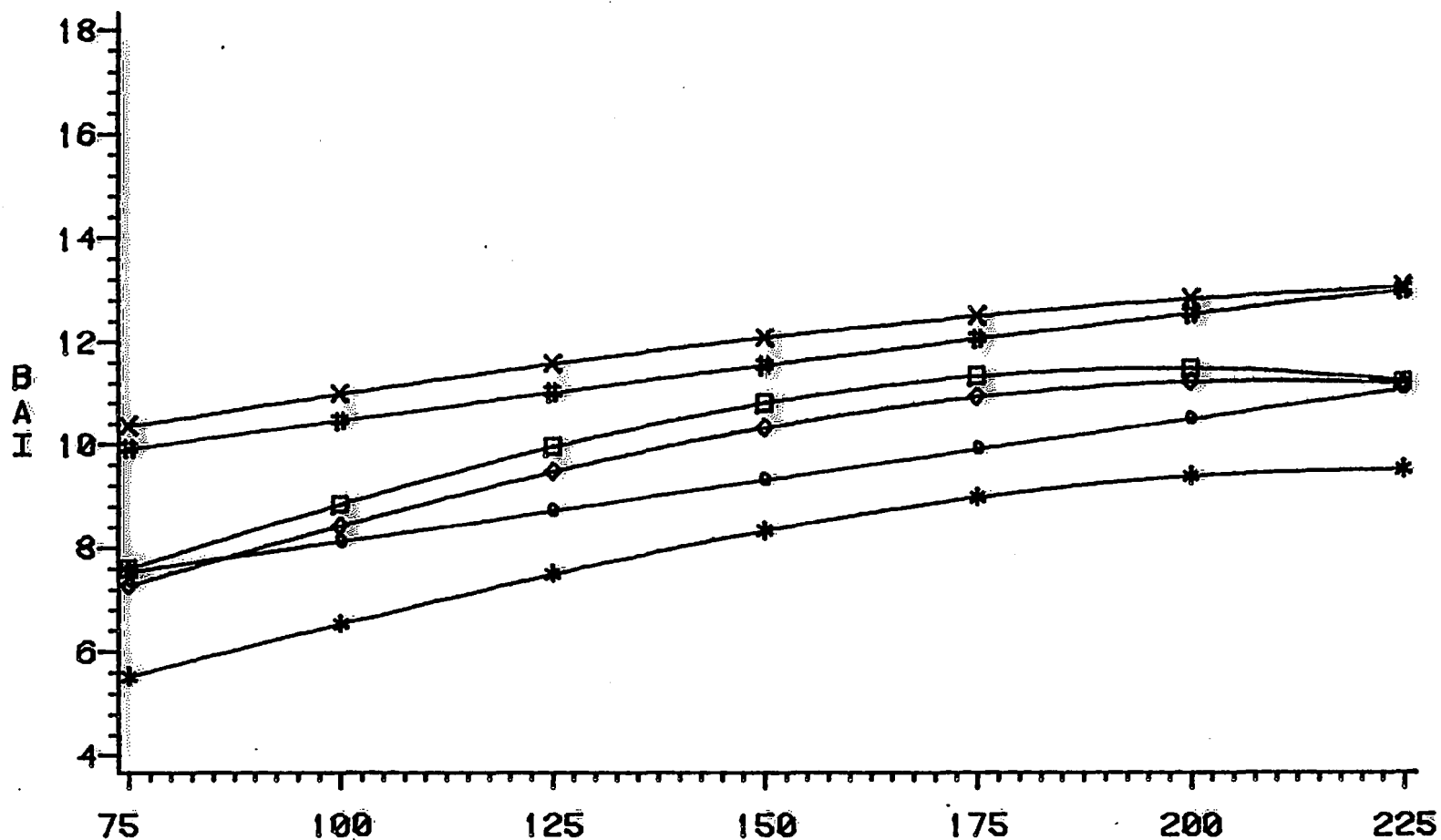
◇-◇-◇ 1981, 200 LBS

○-○-○ 1982, CONTROL

--* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=CENTRAL IDAHO



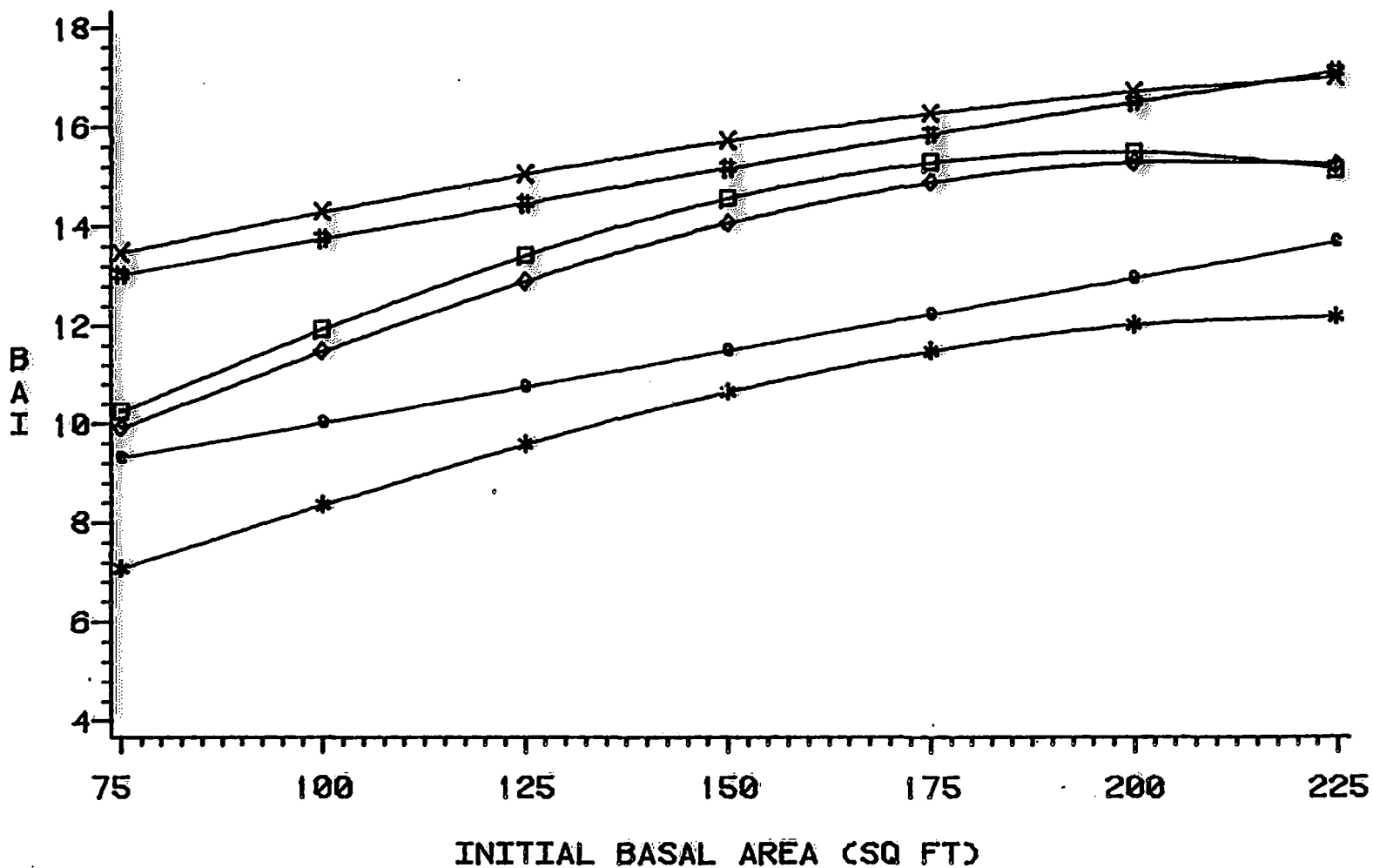
INITIAL BASAL AREA (SQ FT)

LEGEND: YEAR_TRT

--* 1981, CONTROL	◇-◇-◇ 1981, 200 LBS
□-□-□ 1981, 400 LBS	○-○-○ 1982, CONTROL
#-#-# 1982, 200 LBS	*-*-* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NORTH IDAHO



LEGEND: YEAR_TRT

--* 1981, CONTROL

□-□-□ 1981, 400 LBS

#-#-# 1982, 200 LBS

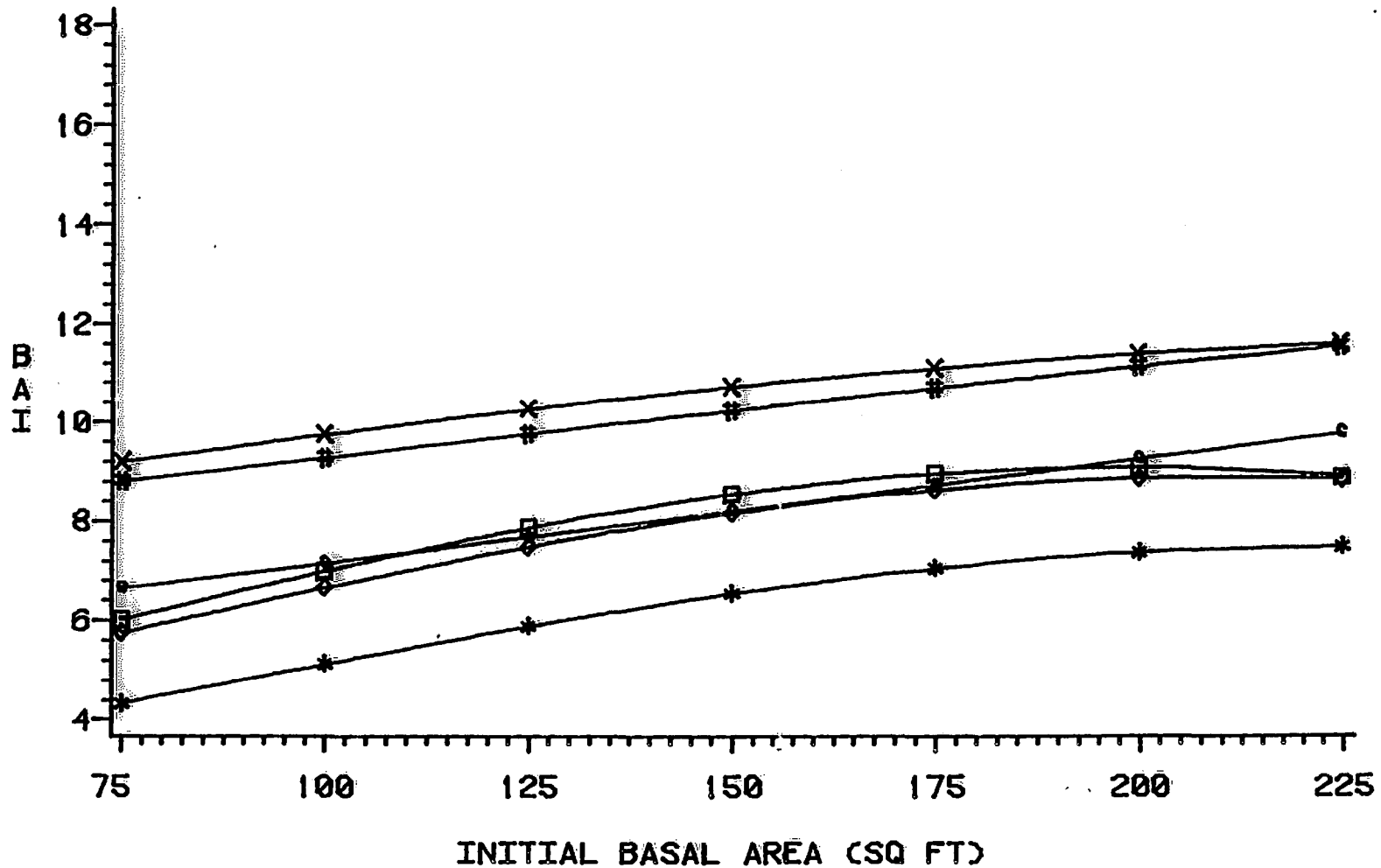
◇-◇-◇ 1981, 200 LBS

○-○-○ 1982, CONTROL

*-x-x 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NE OREGON



LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 #-#-# 1982, 200 LBS

◇-◇-◇ 1981, 200 LBS
 ○-○-○ 1982, CONTROL
 ×-×-× 1982, 400 LBS

Design Model
with Region & trt
BA & trt

% response by
region

FIGURE 2. THE EFFECT OF INITIAL BASAL AREA PER ACRE ON TWO-YEAR RELATIVE BASAL AREA RESPONSE FOR NORTH IDAHO.

BAI INCREASE DUE TO FERTILIZATION REGION-NORTH IDAHO

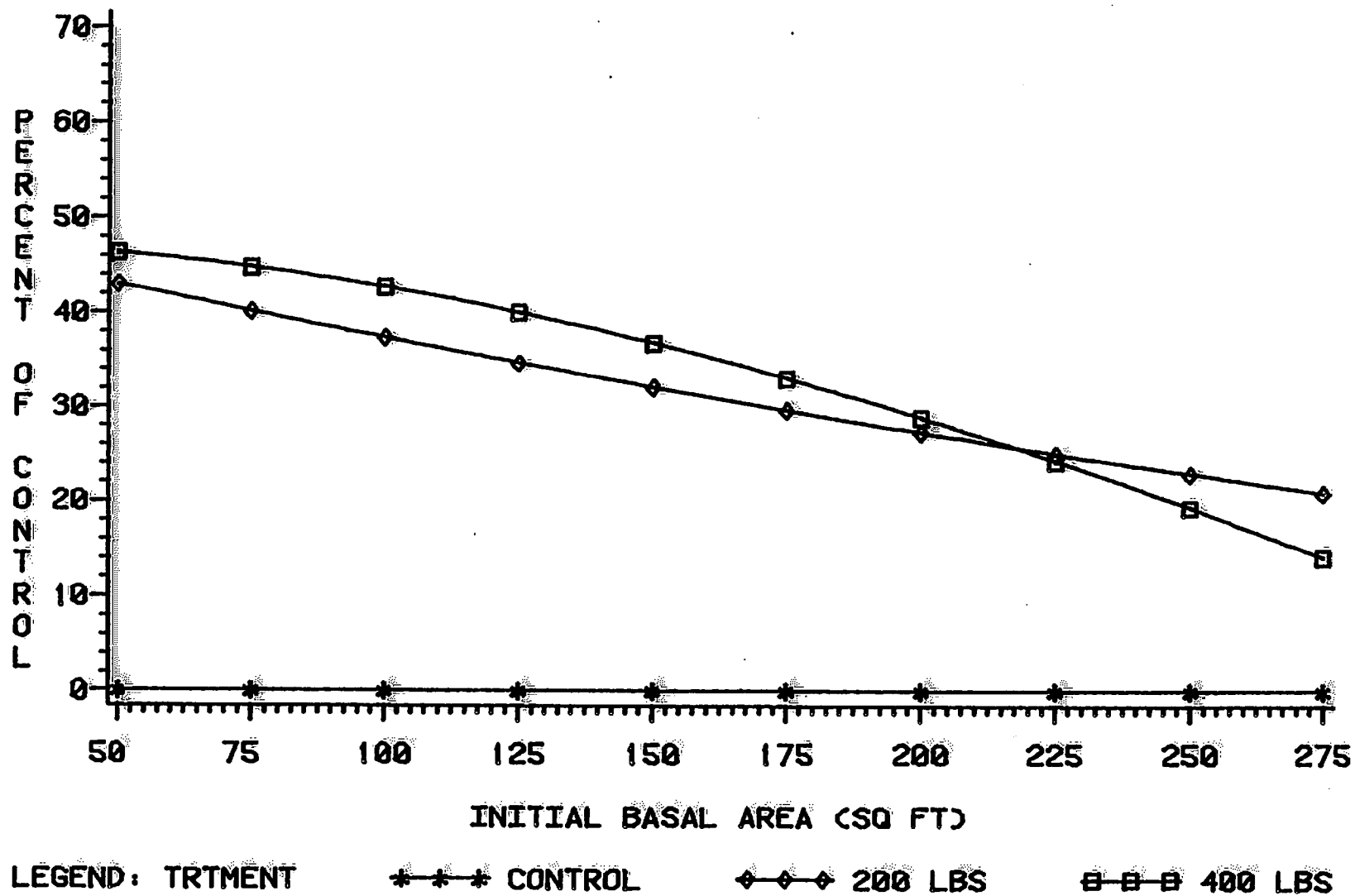


FIGURE 3. THE EFFECT OF INITIAL BASAL AREA PER ACRE ON TWO-YEAR RELATIVE BASAL AREA RESPONSE FOR MONTANA.

BAI INCREASE DUE TO FERTILIZATION

REGION=MONTANA

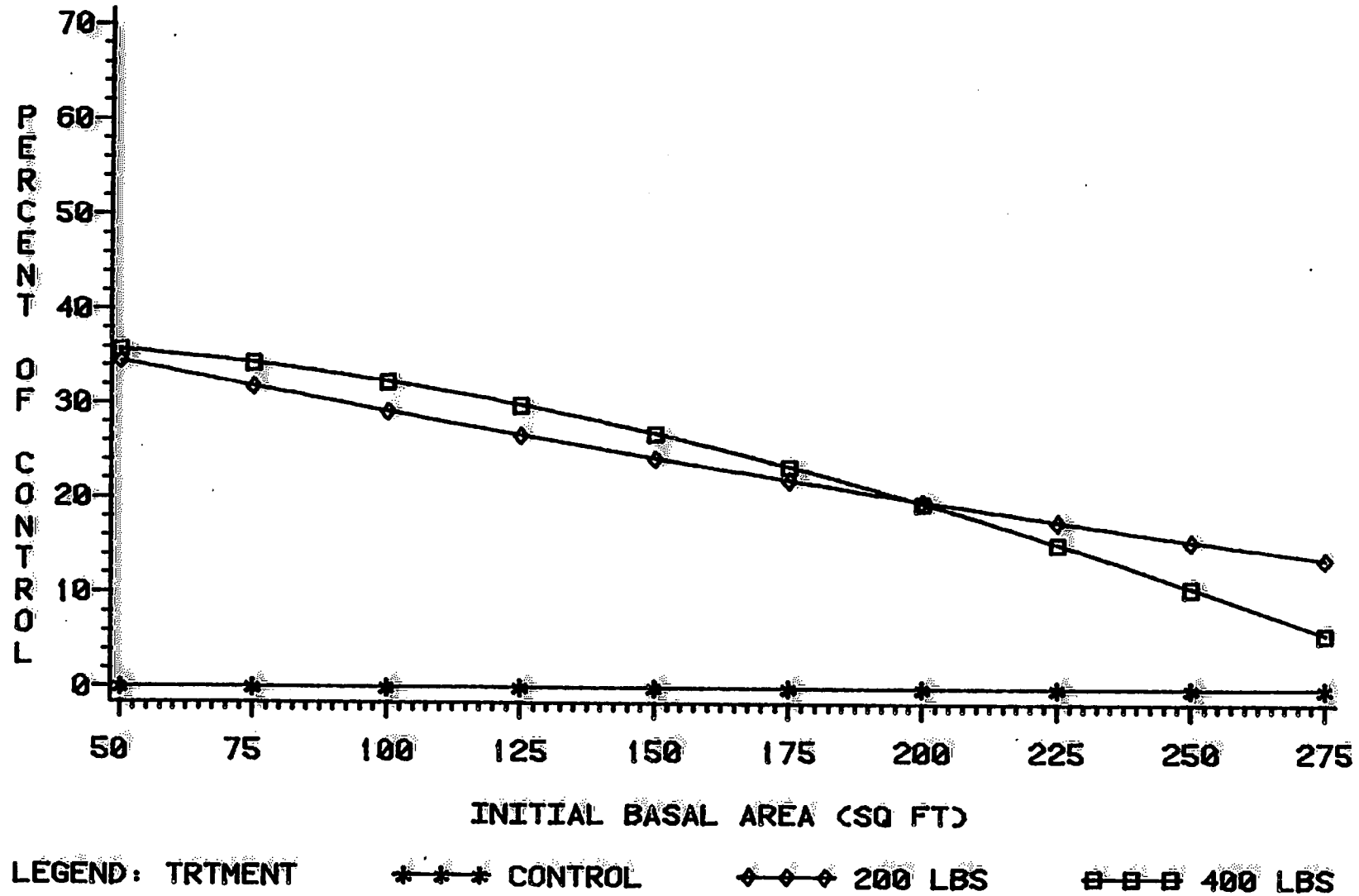


FIGURE 4. THE EFFECT OF INITIAL BASAL AREA PER ACRE ON TWO-YEAR RELATIVE BASAL AREA RESPONSE FOR CENTRAL IDAHO.

BAI INCREASE DUE TO FERTILIZATION

REGION-CENTRAL IDAHO

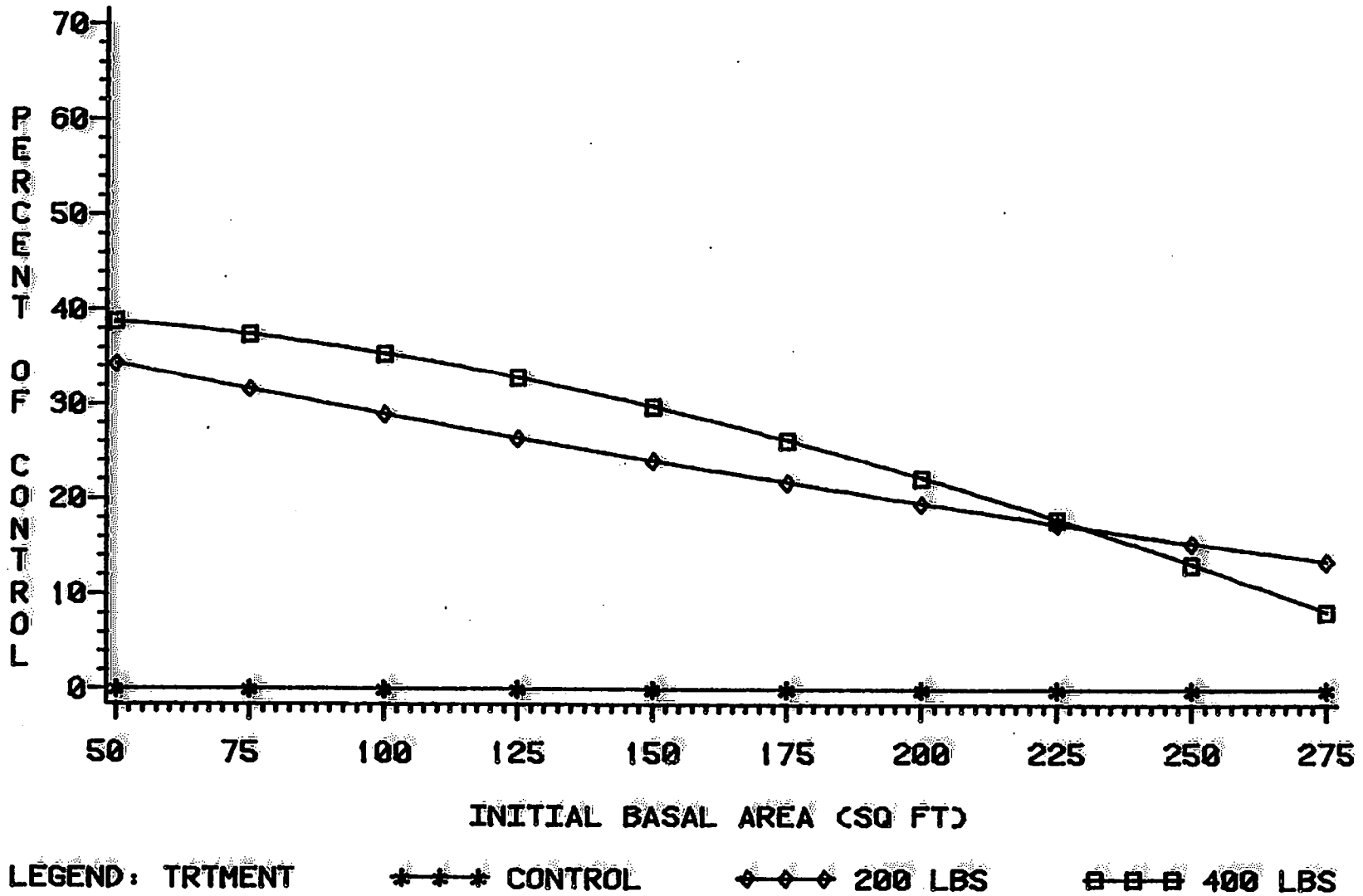


FIGURE 5. THE EFFECT OF INITIAL BASAL AREA PER ACRE ON TWO-YEAR RELATIVE BASAL AREA RESPONSE FOR NORTHEAST OREGON.

BAI INCREASE DUE TO FERTILIZATION

REGION=NE OREGON

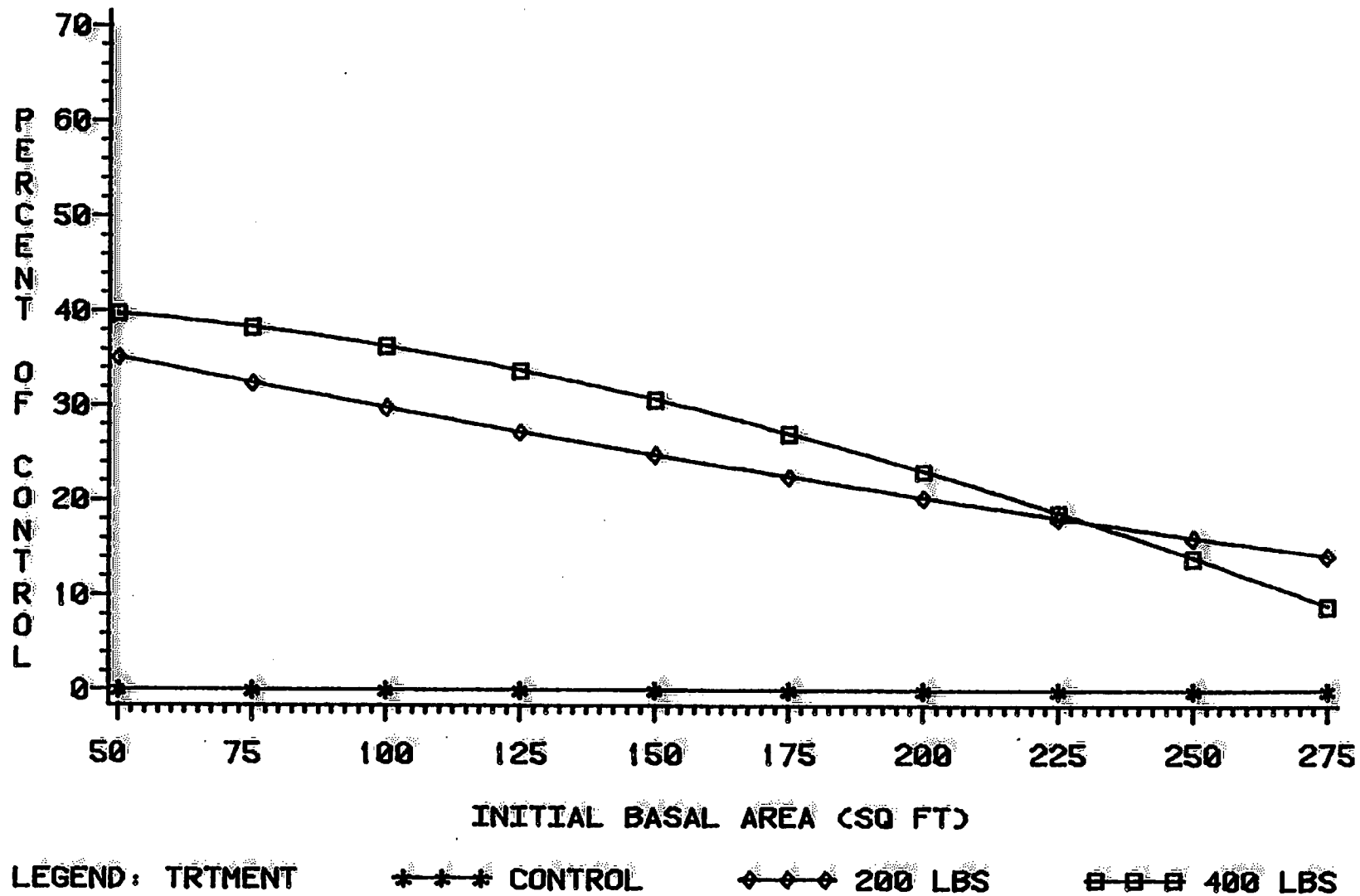


FIGURE 6. THE EFFECT OF INITIAL BASAL AREA PER ACRE ON TWO-YEAR RELATIVE BASAL AREA RESPONSE FOR CENTRAL WASHINGTON.

BAI INCREASE DUE TO FERTILIZATION REGION-CEN WASHINGTON

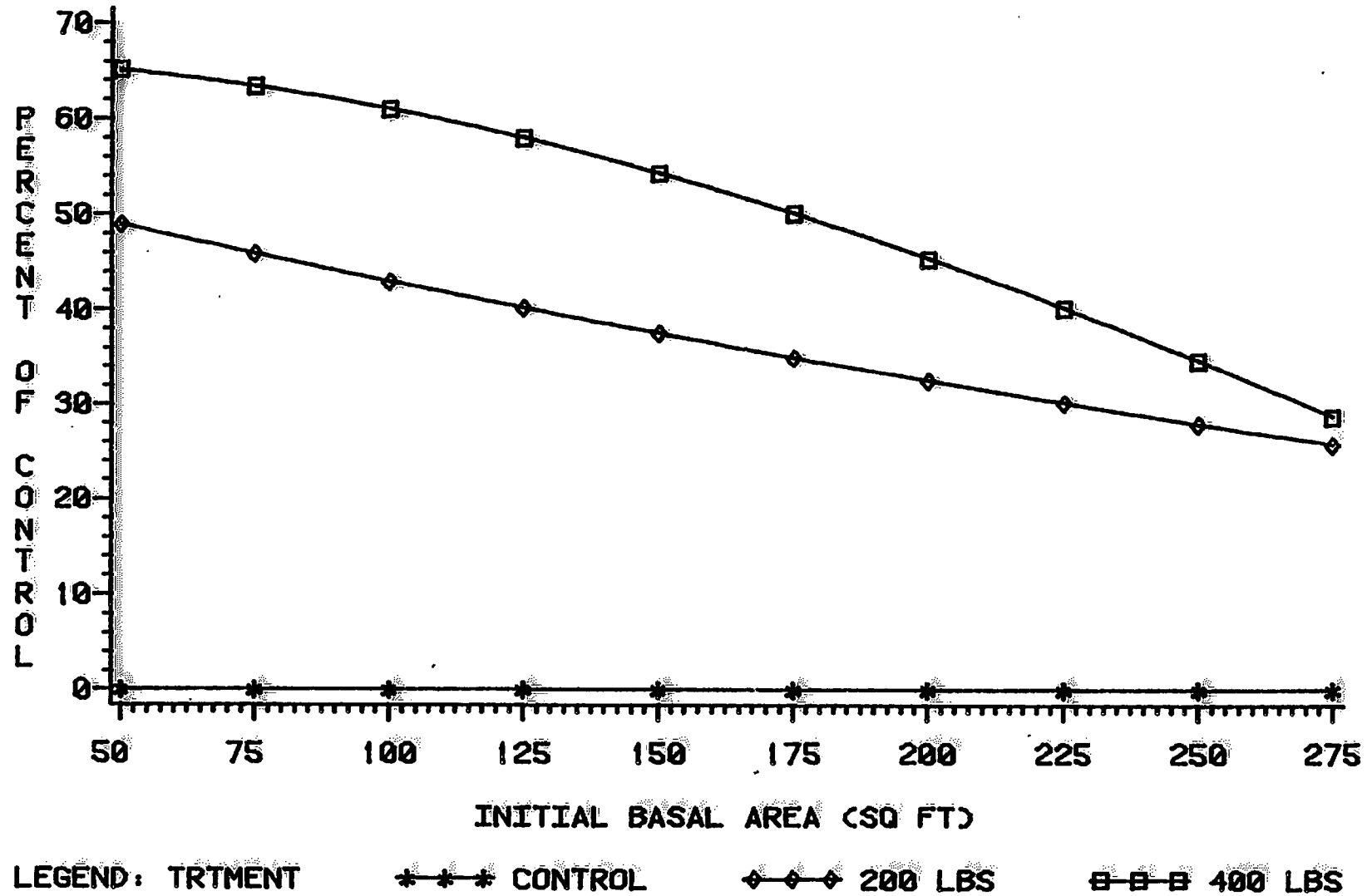


FIGURE 7. THE EFFECT OF INITIAL BASAL AREA PER ACRE ON TWO-YEAR RELATIVE BASAL AREA RESPONSE FOR NORTHEAST WASHINGTON.

BAI INCREASE DUE TO FERTILIZATION REGION-NE WASHINGTON

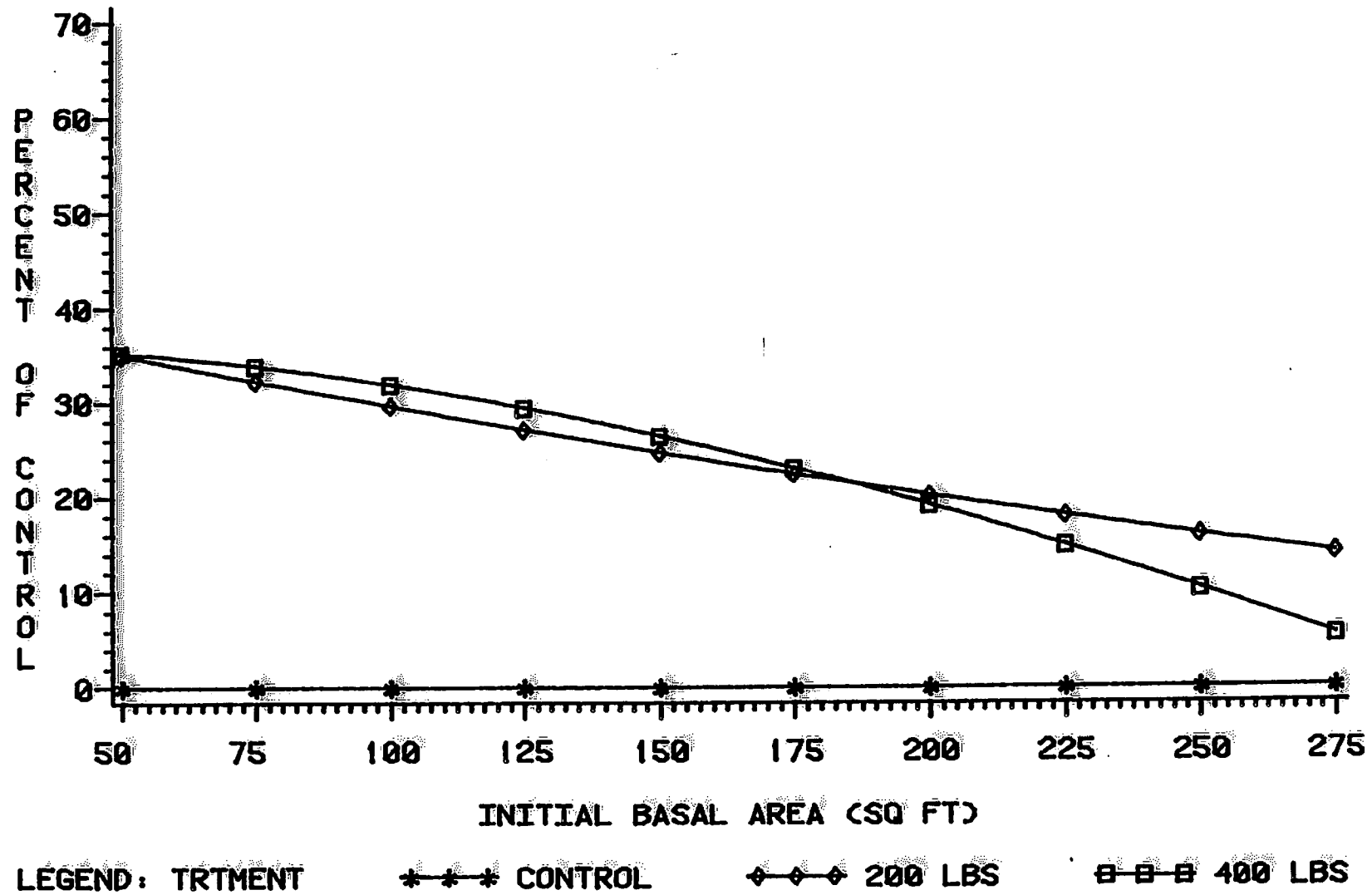


Table 4. Comparison of long-term average annual precipitation (1948-1978) to recent individual yearly amounts in inches.

Region	Station	Number years	Mean	Standard deviation	Years			
					1980	1981	1982	1983
North Idaho	Priest River							
	Exp. Sta. Headquarters	31 17	32.95 40.62	4.83 6.14	35.08 34.42*	31.53 40.10	38.72* --	39.45* 40.03
Montana	Missoula	30	13.06	2.52	19.35*	17.35*	15.38	16.71*
	Polson	22	15.40	3.15	24.20*	18.83*	17.80	17.44
Central Idaho	McCall	31	28.24	3.83	34.85*	30.07	36.70*	33.77*
Northeastern Oregon	Enterprise	28	13.44	2.02	16.71*	--	--	17.52*
	Baker	30	10.32	2.24	13.37*	13.86*	12.02	13.36*
Central Washington	Appleton	19	33.09	6.88	39.4	35.5	41.2*	45.5*
	Cle Elum	26	23.20	6.19	24.2	22.7	22.7	22.3
	Conconully	18	14.72	2.65	18.6*	18.2*	20.8*	28.7*
Northeastern Washington	Colville	27	17.37	2.58	25.3*	24.2*	21.27*	27.75*

Table 5. Regional comparison of long-term January average minimum temperatures (1948-1978) to recent individual January average minimums in degrees Fahrenheit.

Region	Station	Number years	Mean	Standard deviation	Years				
					1980	1981	1982	1983	1984
North Idaho	Priest River	31	17.67	7.24	12.6	25.6*	18.9	--	21.6
	Exp. Sta. Headquarters	17	16.89	5.21	10.5*	24.0*	18.2	--	15.5
Montana	Missoula	30	13.15	7.52	8.5	25.1*	13.7	23.5*	18.4
	Polson	24	18.12	7.56	--	28.2*	18.8	27.8*	21.5
Central Idaho	McCall	31	11.54	6.75	12.6	18.9*	12.6	--	9.5
Northeastern Oregon	Enterprise	31	14.0	6.79	10.3	22.0*	--	--	10.7
	Baker	30	16.04	8.14	17.9	27.7	13.5	--	13.7
Central Washington	Appleton	19	23.39	4.19	15.0*	30.0*	24.2	--	24.6
	Cle Elum	29	17.88	7.56	8.5*	30.8*	21.5	--	23.4*
	Conconully	29	12.39	7.84	4.6*	24.5*	13.4	--	23.0*
Northeastern Washington	Colville	30	16.5	7.57	12.9	27.7*	18.9	--	23.0

Table 6. Regional comparison of long-term July average maximum temperatures (1948-1978) to recent individual July average maximums in degrees Fahrenheit.

Region	Station	Number years	Mean	Standard deviation	Years				
					1980	1981	1982	1983	1984
North Idaho	Priest River								
	Exp. Sta.	31	82.23	2.80	80.1	79.0*	77.0*	--	80.5
	Headquarters	17	81.42	2.33	79.8	79.4	77.6*	--	--
Montana	Missoula	31	84.4	3.37	81.1	88.1*	79.0*	75.9*	85.1
	Polson	25	81.4	3.17	79.5	85.9	--	76.0*	86.0*
Central Idaho	McCall	31	80.72	2.77	78.6	79.7	75.1*	--	81.2
Northeastern Oregon	Enterprise	31	82.67	2.85	79.9	77.5*	75.2*	--	79.2
	Baker	30	85.0	2.40	85.2	84.1	81.3	--	85.8
Central Washington	Appleton	20	79.73	3.0	76.6*	74.0*	76.5*	--	79.8
	Cle Elum	30	81.4	3.68	81.4	78.5	80.8	--	80.3
	Conconully	23	82.3	3.78	83.2	79.6	79.9	--	--
Northeastern Washington	Colville	30	85.5	3.20	82.6	78.3*	79.7*	--	83.5

DESIGN MODEL 2

LN (BAI) =

F (YEAR , REGION , YEAR X REGION,

INSTALLATION (YEAR REGION)

BLOCK (YEAR REGION INSTALLATION)

TREATMENT

BA BA x YEAR

BA² BA² x YEAR

MIN N MIN N x TREATMENT)

*Trt x Region
BA x Trt*

R² = 0.9038

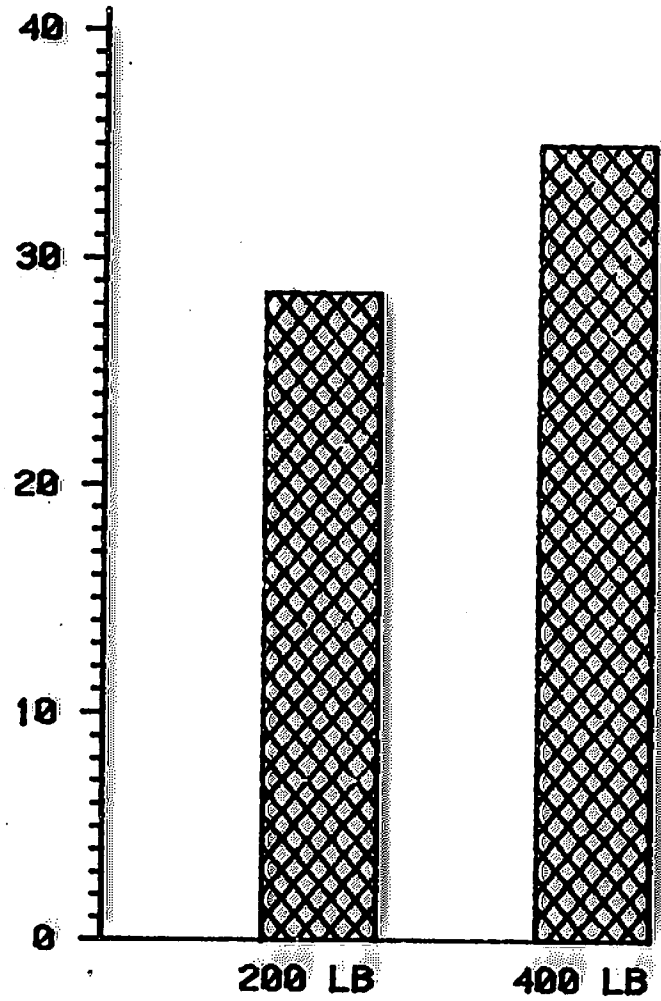
MSE = 0.0232

CV = 6.71%

BAI INCREASE OVER CONTROL (%)

BY TREATMENT

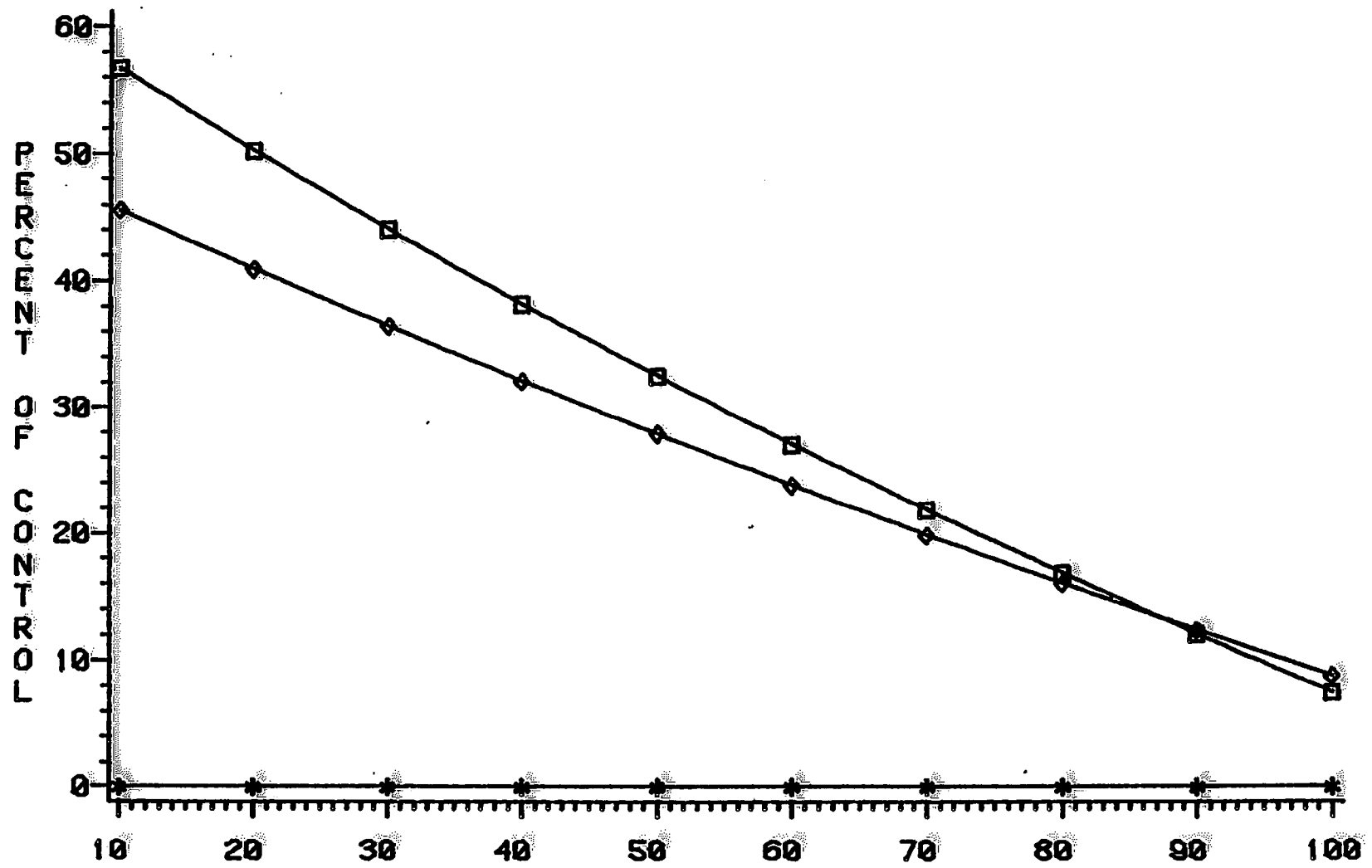
RESPONSE



TREATMENT

FIGURE 8. THE RELATIONSHIP BETWEEN NITROGEN MINERALIZATION RATE BEFORE TREATMENT AND TWO-YEAR BASAL AREA RELATIVE RESPONSE TO NITROGEN FERTILIZATION.

BAI INCREASE DUE TO FERTILIZATION

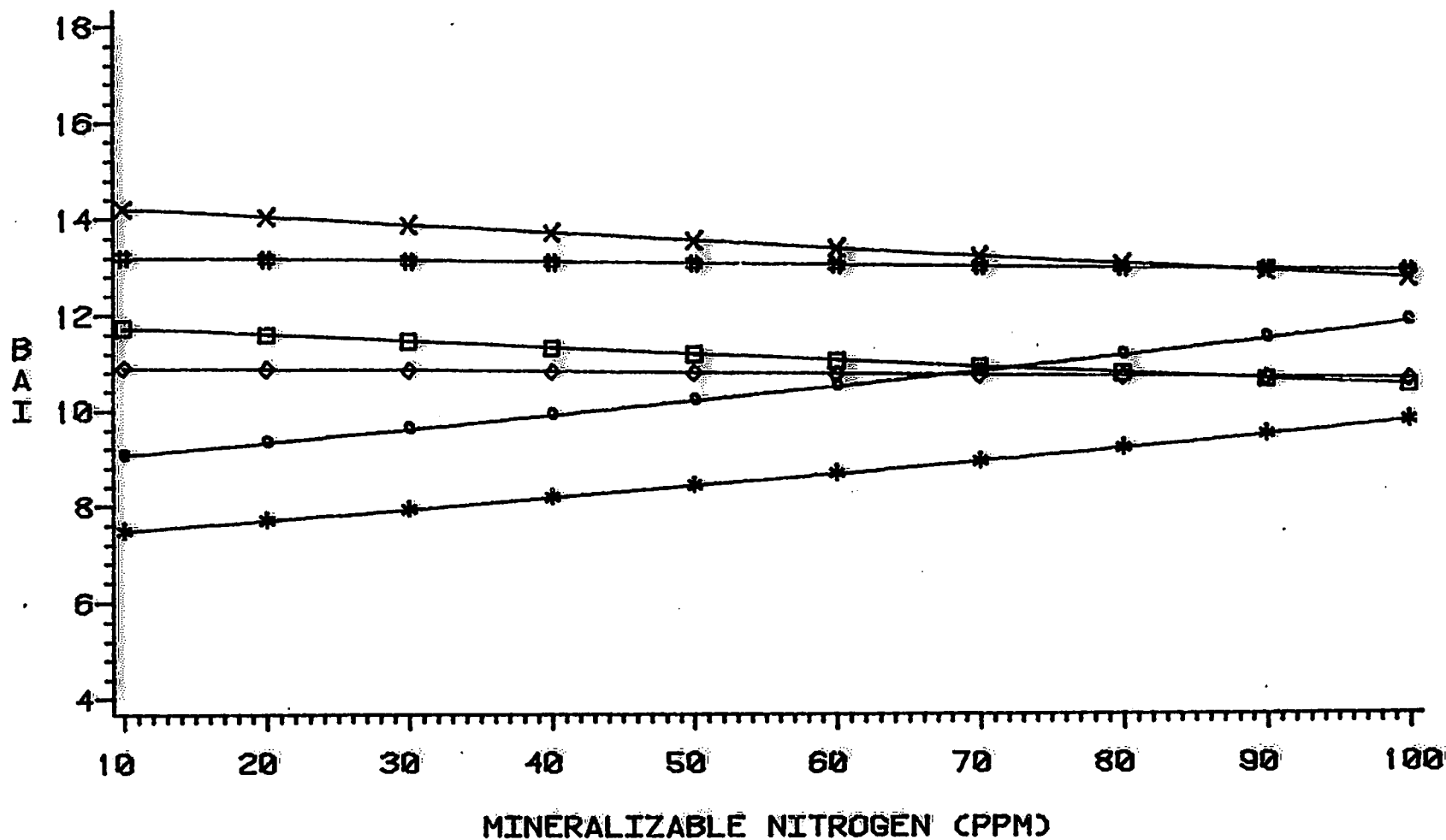


LEGEND: TRTMENT *-*-* CONTROL ◆◆◆ 200 LBS ■■■ 400 LBS

Design Model
with
Mineralizable
Nitrogen
BAI vs. Min N

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=CEN WASHINGTON



LEGEND: YEAR_TRT

--* 1981, CONTROL

□-□-□ 1981, 400 LBS

#-#-# 1982, 200 LBS

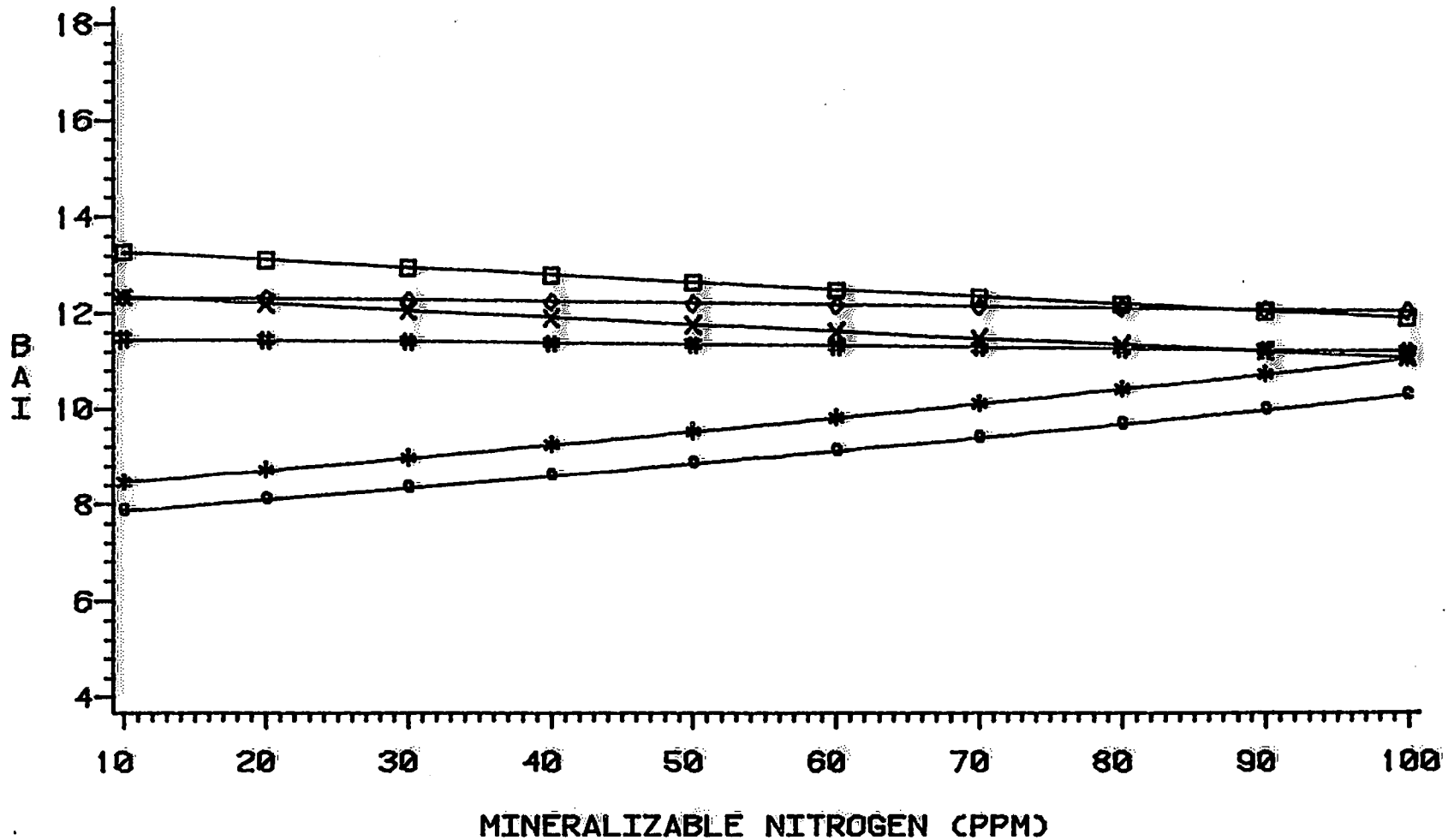
◇-◇-◇ 1981, 200 LBS

○-○-○ 1982, CONTROL

--* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NE WASHINGTON



LEGEND: YEAR_TRT

--* 1981, CONTROL

◇-◇-◇ 1981, 200 LBS

□-□-□ 1981, 400 LBS

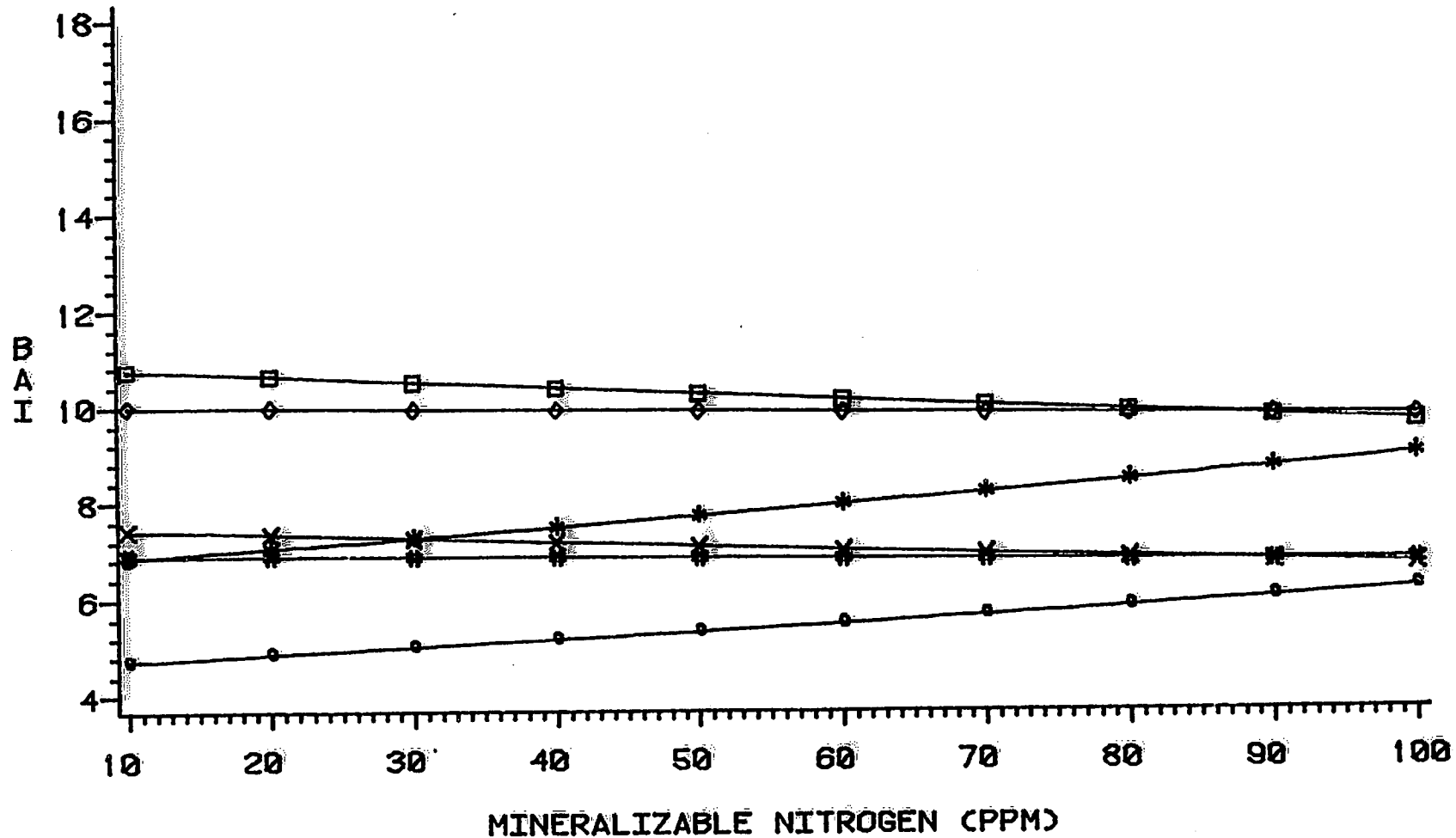
○-○-○ 1982, CONTROL

#-#-# 1982, 200 LBS

--* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=MONTANA



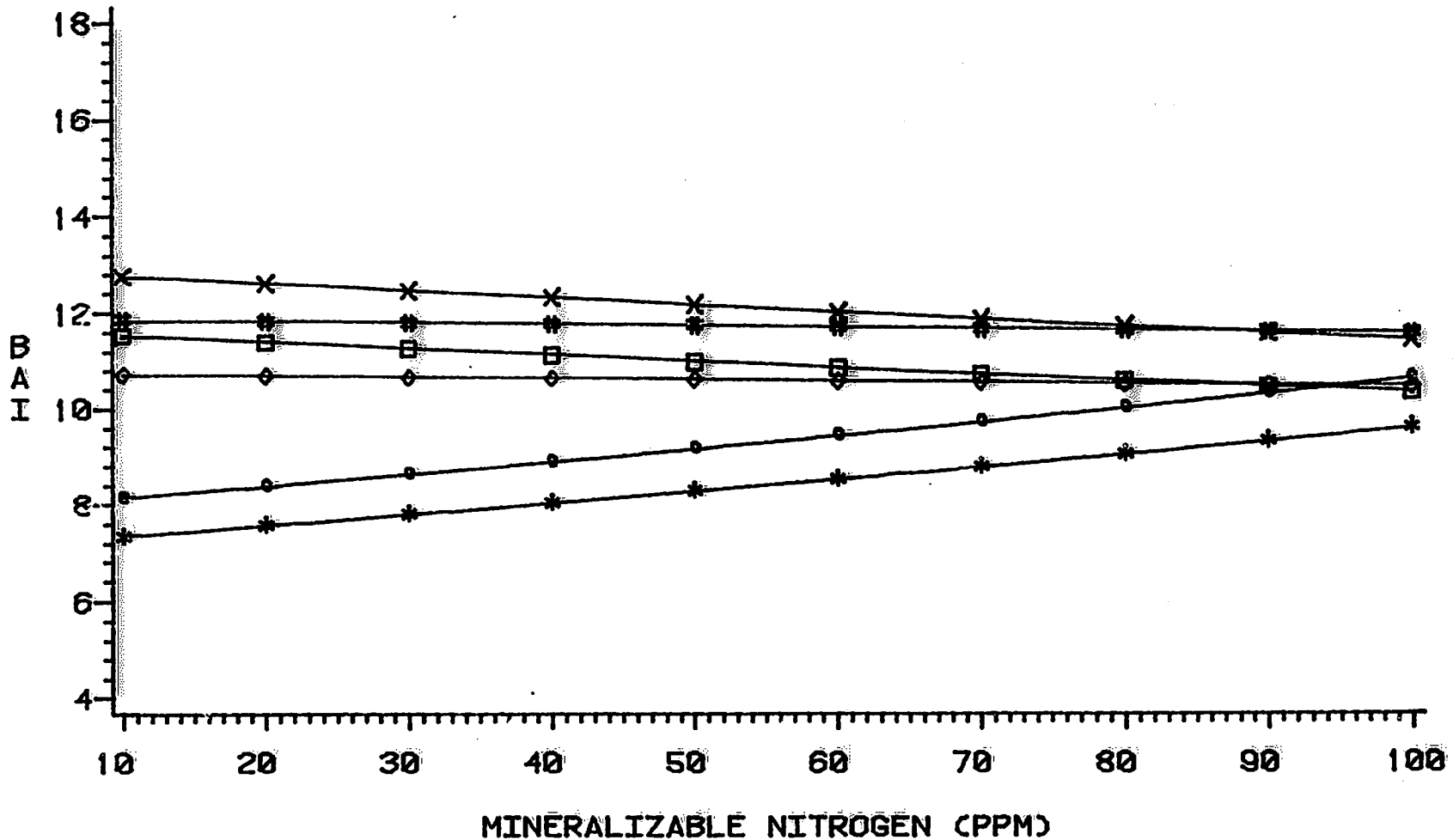
LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 #-#-# 1982, 200 LBS

◇-◇-◇ 1981, 200 LBS
 ○-○-○ 1982, CONTROL
 x-x-x-x 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=CENTRAL IDAHO



LEGEND: YEAR_TRT

--* 1981, CONTROL

□-□-□ 1981, 400 LBS

#-#-# 1982, 200 LBS

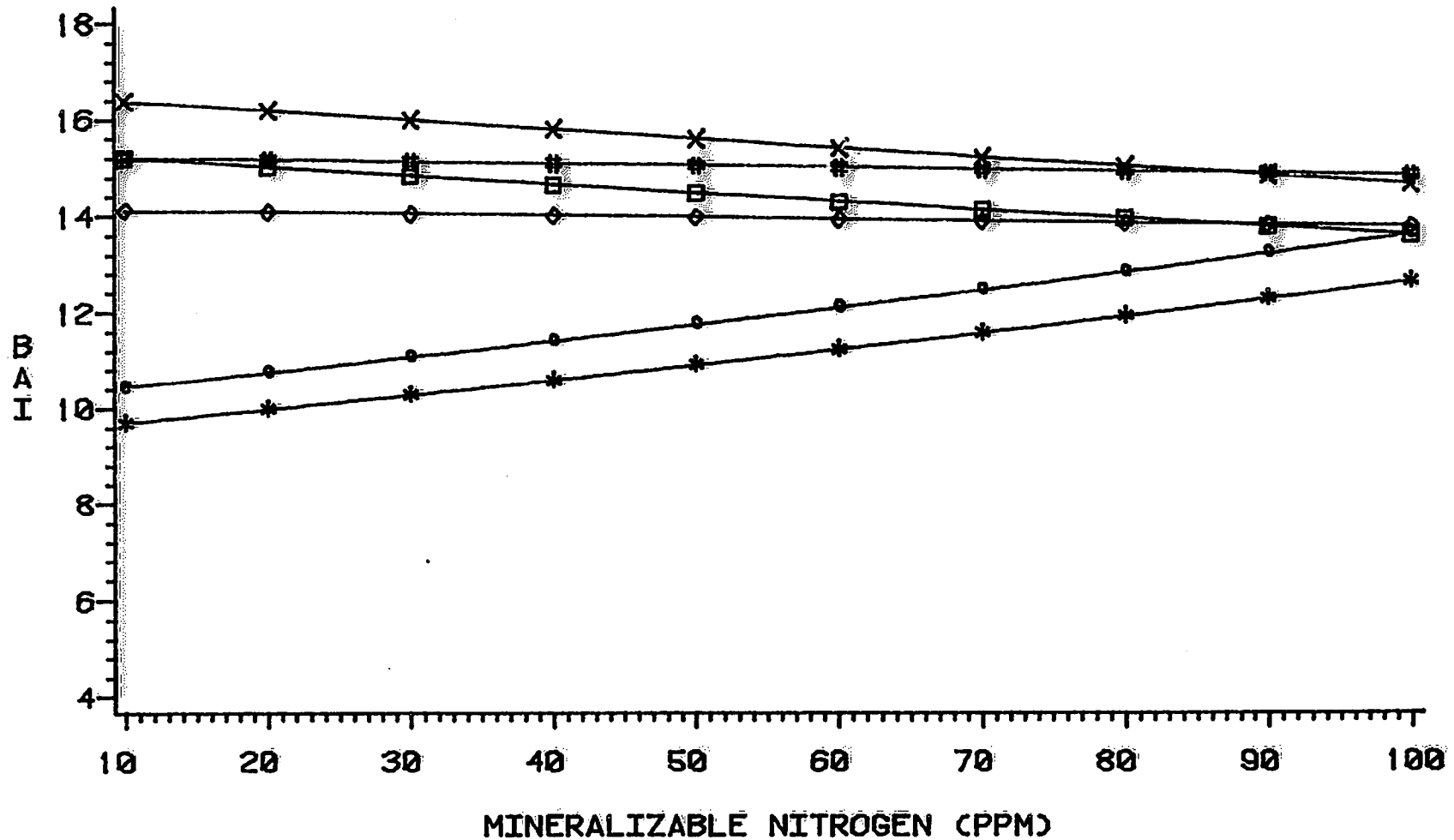
◇-◇-◇ 1981, 200 LBS

○-○-○ 1982, CONTROL

--* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NORTH IDAHO



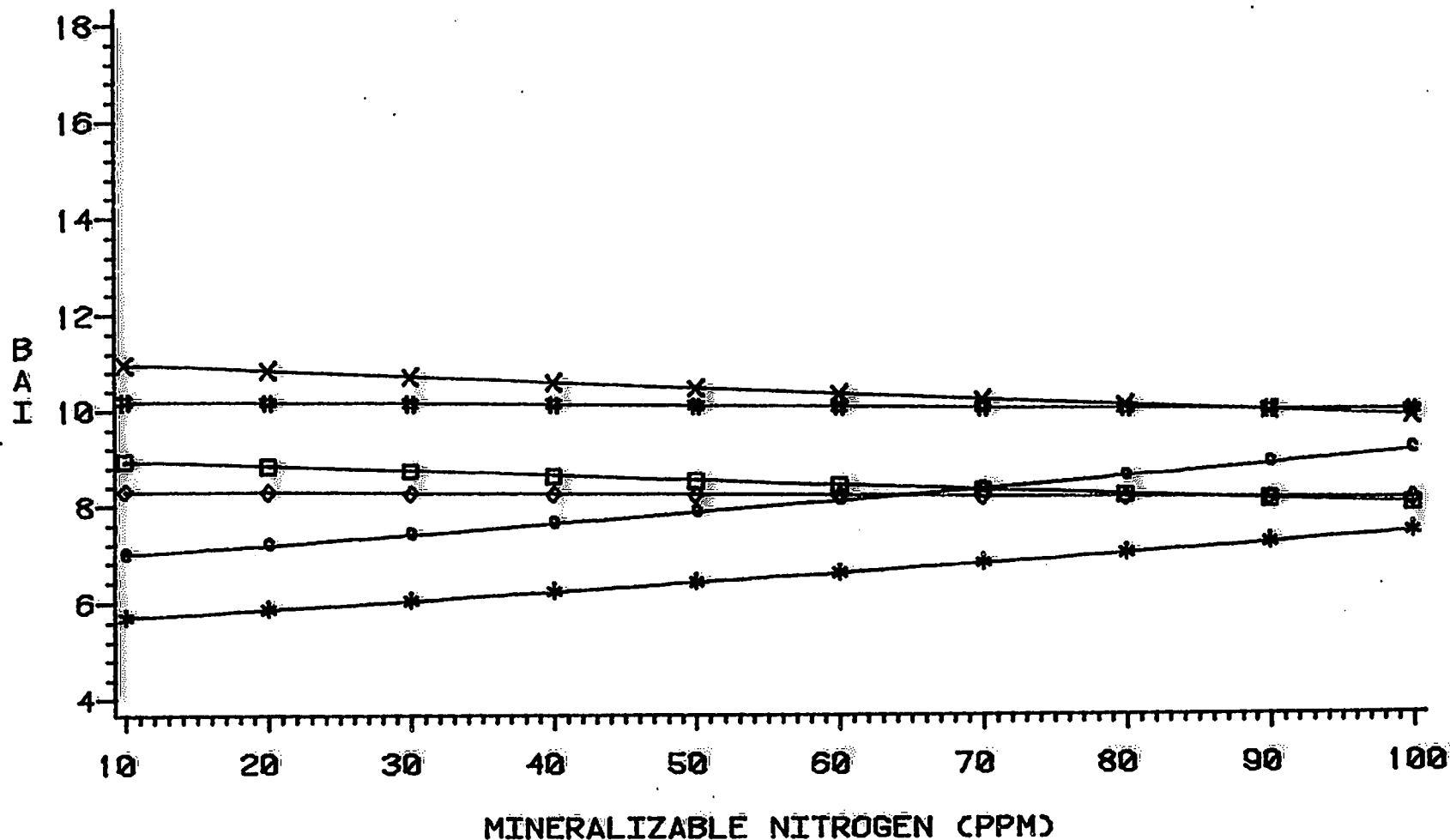
LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 #-#-# 1982, 200 LBS

◊-◊-◊ 1981, 200 LBS
 ○-○-○ 1982, CONTROL
 x-x-x 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NE OREGON



LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 #-#-# 1982, 200 LBS

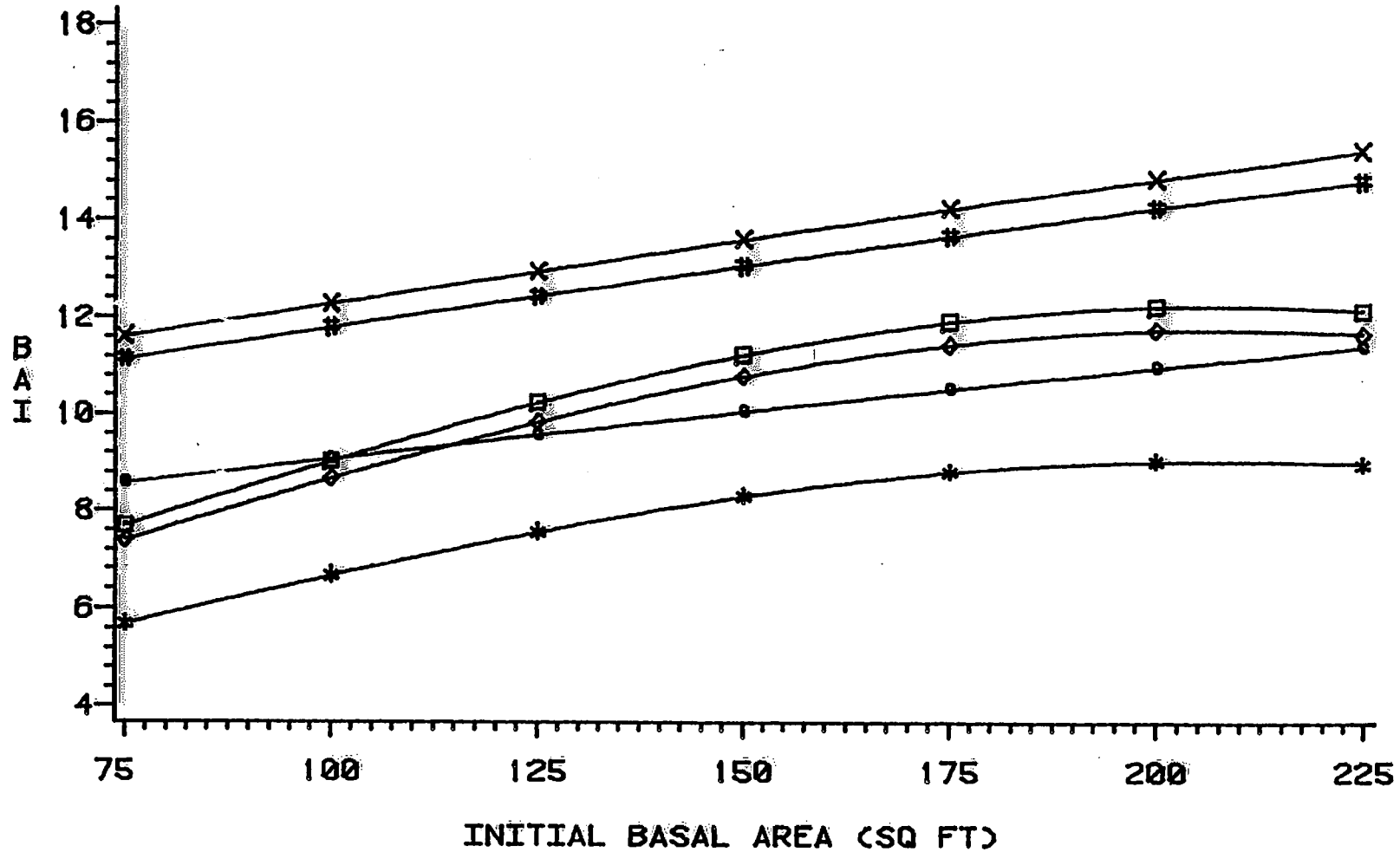
◇-◇-◇ 1981, 200 LBS
 ○-○-○ 1982, CONTROL
 ×-×-× 1982, 400 LBS

Design Model
with
Mineralizable
Nitrogen

BAI vs. BA

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=CEN WASHINGTON



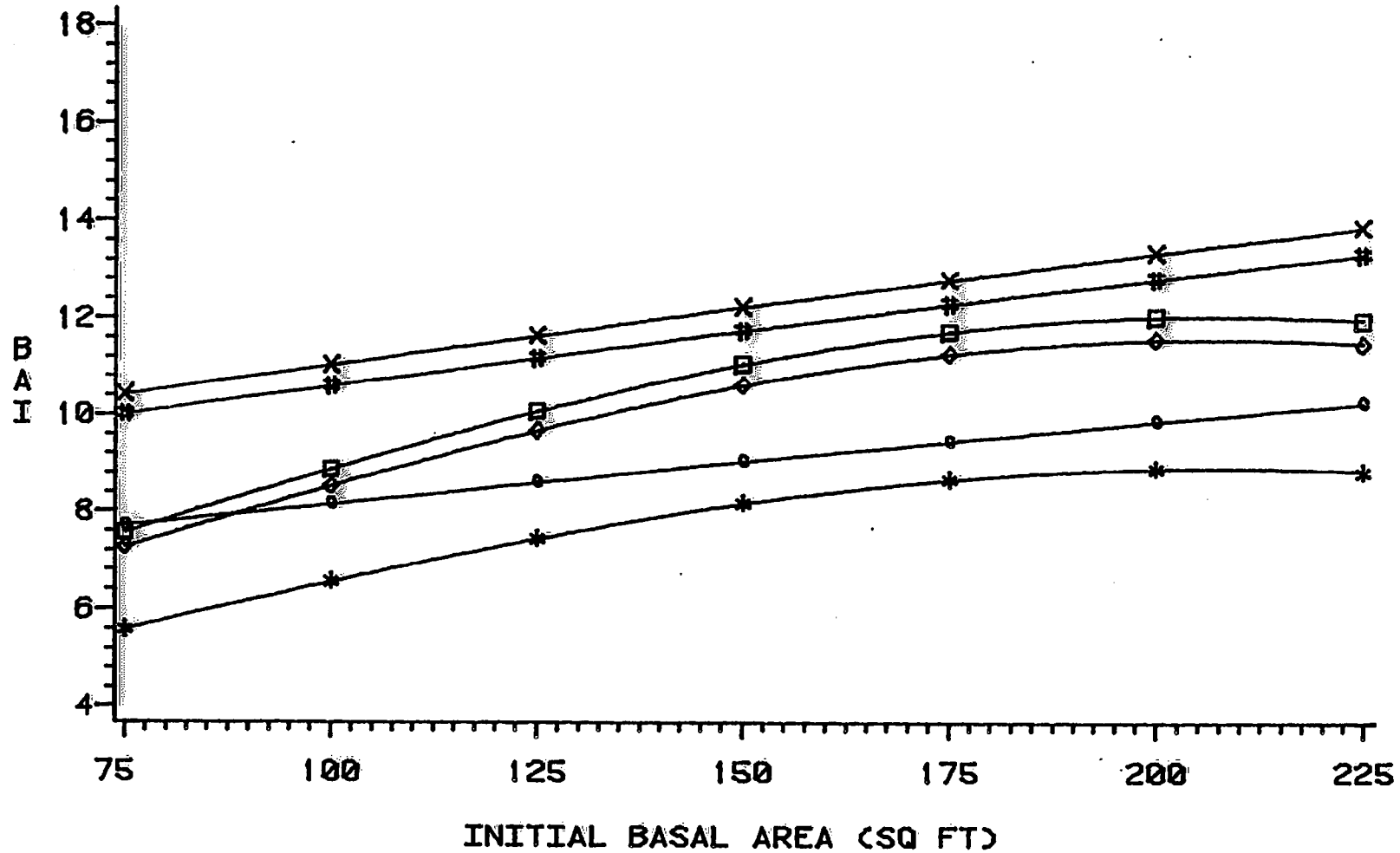
LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 --* 1982, 200 LBS

◇-◇-◇ 1981, 200 LBS
 ●-●-● 1982, CONTROL
 --* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=CENTRAL IDAHO



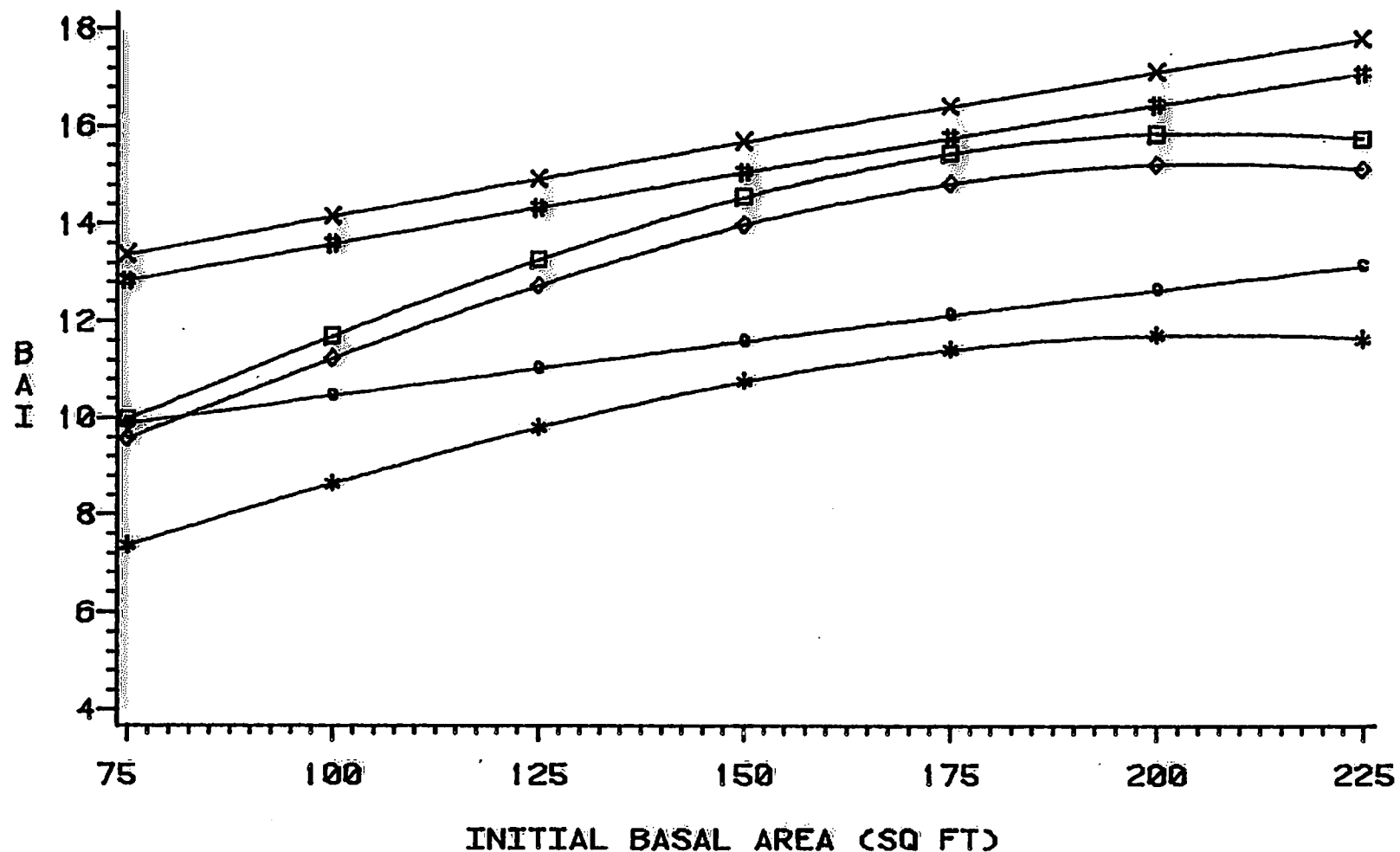
LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 --* 1982, 200 LBS

◇-◇-◇ 1981, 200 LBS
 ○-○-○ 1982, CONTROL
 --* 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NORTH IDAHO



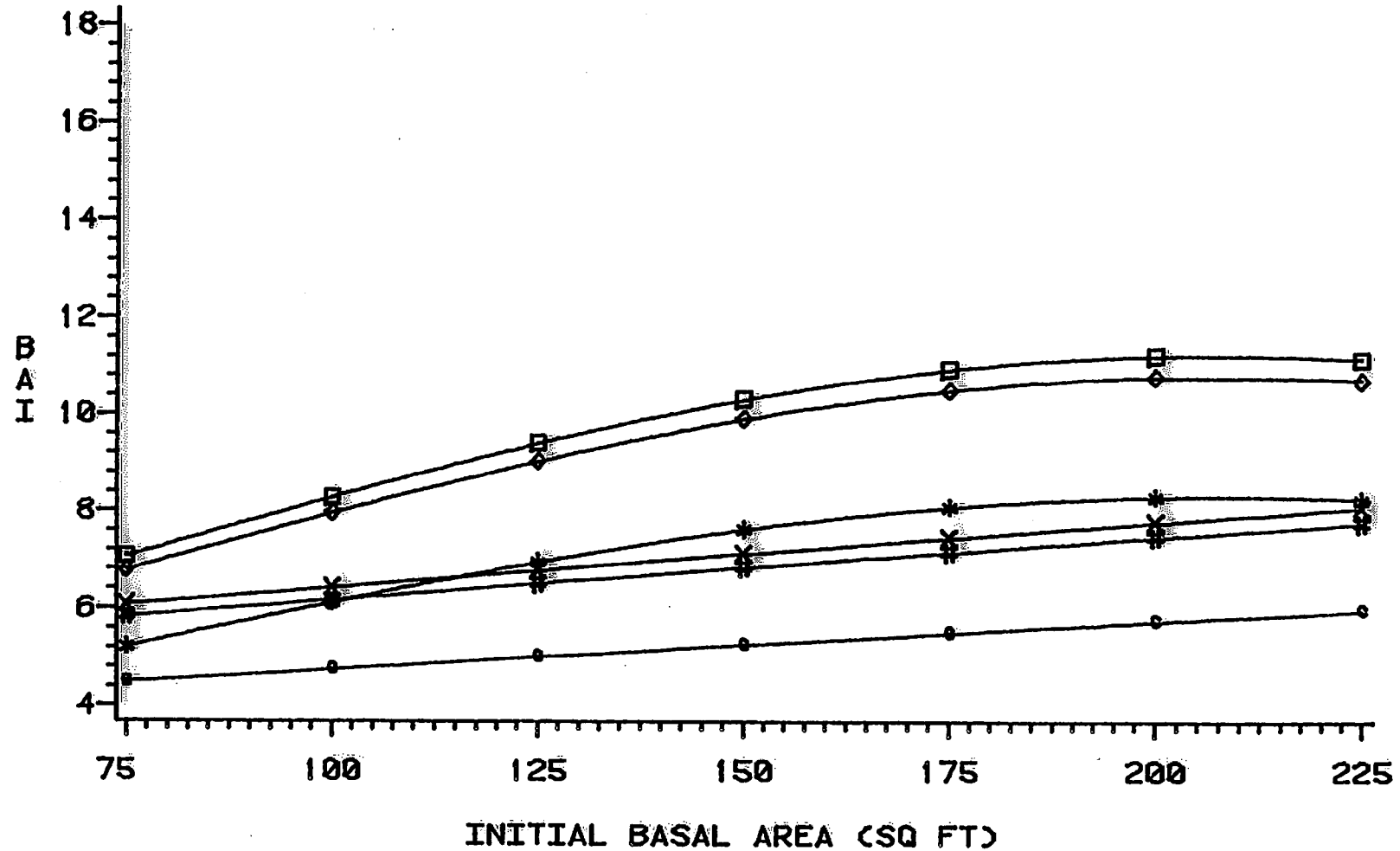
LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 #- #-# 1982, 200 LBS

◇-◇-◇ 1981, 200 LBS
 ○-○-○ 1982, CONTROL
 x-x-x 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=MONTANA



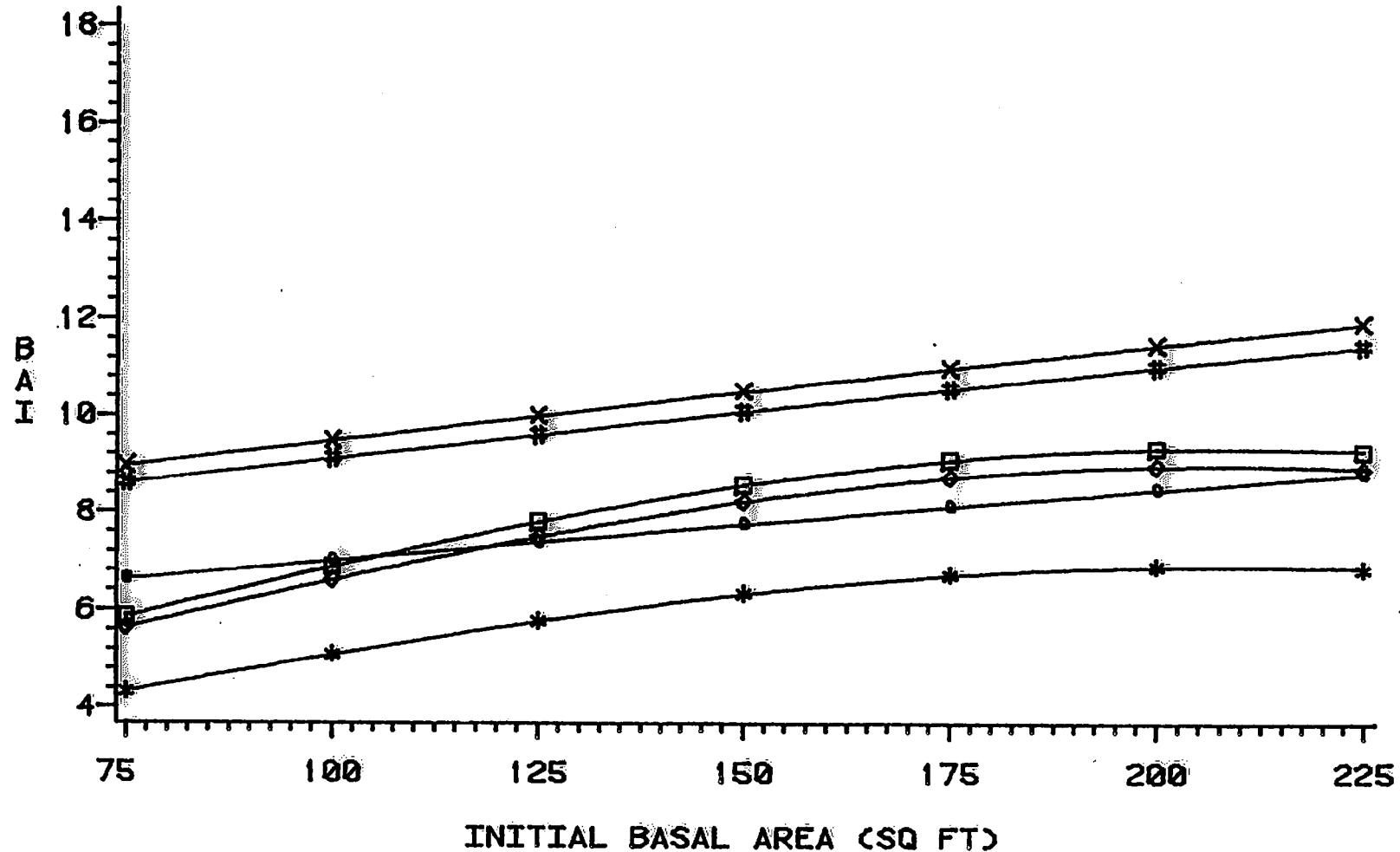
LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 #-#-# 1982, 200 LBS

◇-◇-◇ 1981, 200 LBS
 ○-○-○ 1982, CONTROL
 --*- 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NE OREGON



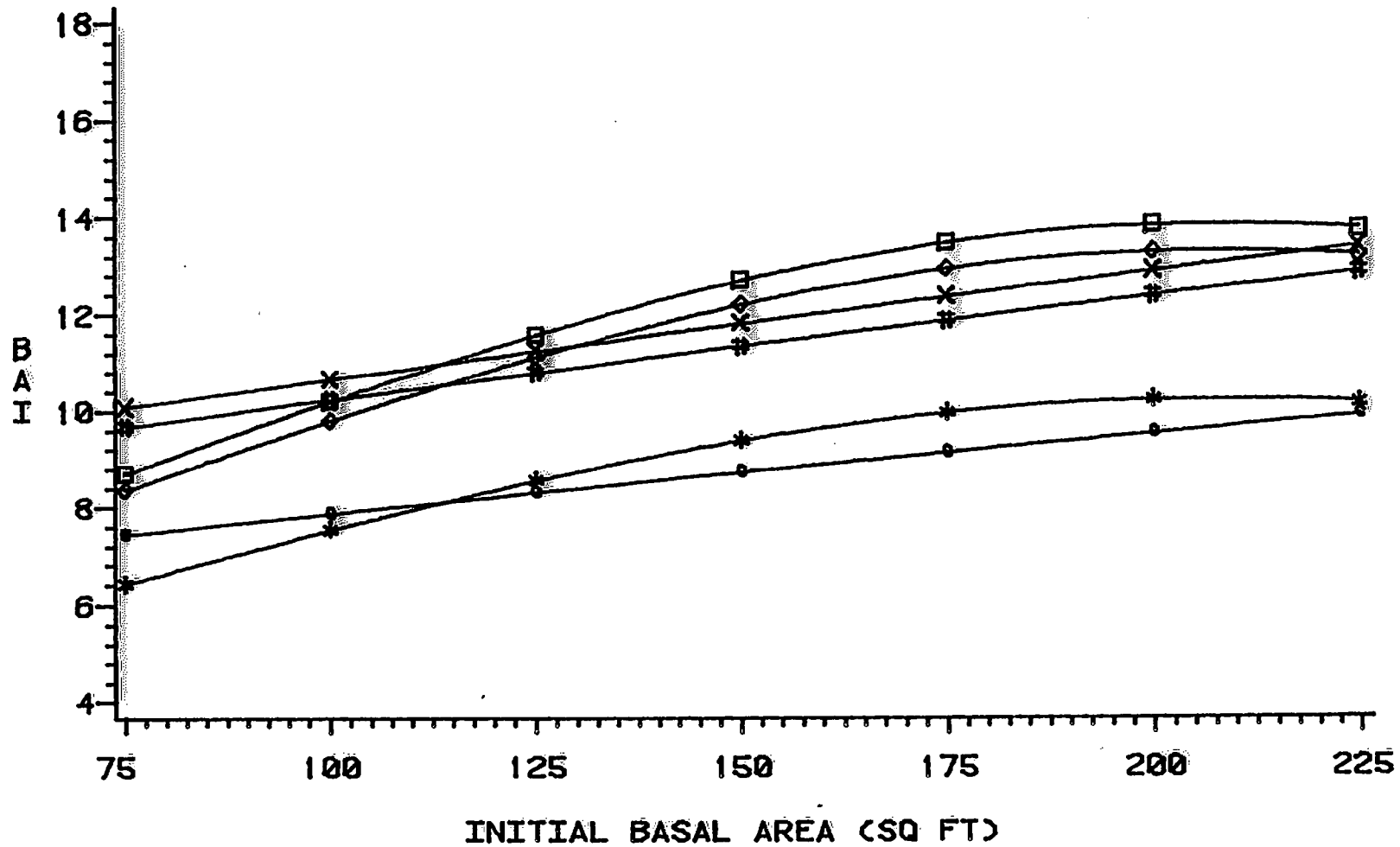
LEGEND: YEAR_TRT

--* 1981, CONTROL
 □-□-□ 1981, 400 LBS
 #- #-# 1982, 200 LBS

◇-◇-◇ 1981, 200 LBS
 ●-●-● 1982, CONTROL
 ×-×-× 1982, 400 LBS

2 YEAR BASAL AREA INCREMENT

GEOGRAPHICAL REGION=NE WASHINGTON



LEGEND: YEAR_TRT

- *-*-* 1981, CONTROL
- ◇-◇-◇ 1981, 200 LBS
- 1981, 400 LBS
- 1982, CONTROL
- #-#-# 1982, 200 LBS
- *-*-* 1982, 400 LBS