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Project Report No. 54, Assessment of Early Estimation of Site Index, Loblolly Pine Plantations East Texas

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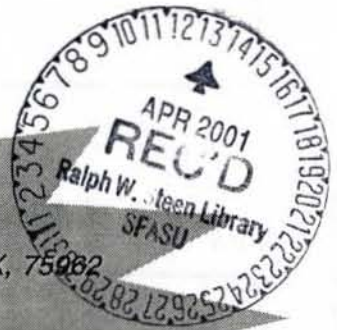
ASSESSMENT OF EARLY ESTIMATION OF SITE INDEX

LOBLOLLY PINE PLANTATIONS EAST TEXAS



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REPORT 54

From
the

East Texas Pine Plantation Research Project
Arthur Temple College of Forestry
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September ... 1997

The Research Question

How reliable is using heights of the taller trees at plantation ages 3, 4 or 5 for estimating site index?

Circumstances

If reliable, dependable and creditable estimates of the ability of the land to grow a loblolly pine plantation can be obtained at an early stage in the life of the plantation, then it may be possible to develop harvest schedules at an earlier stage that will be more representative of the actual future development of the trees.

The Data/The Results

Observations from the East Texas Pine Plantation Research Project were available for analysis in this study.

In particular, observations are available that track the development of loblolly pine plantation parameters, such as age and height during 14, 15 and 16 year periods of time.

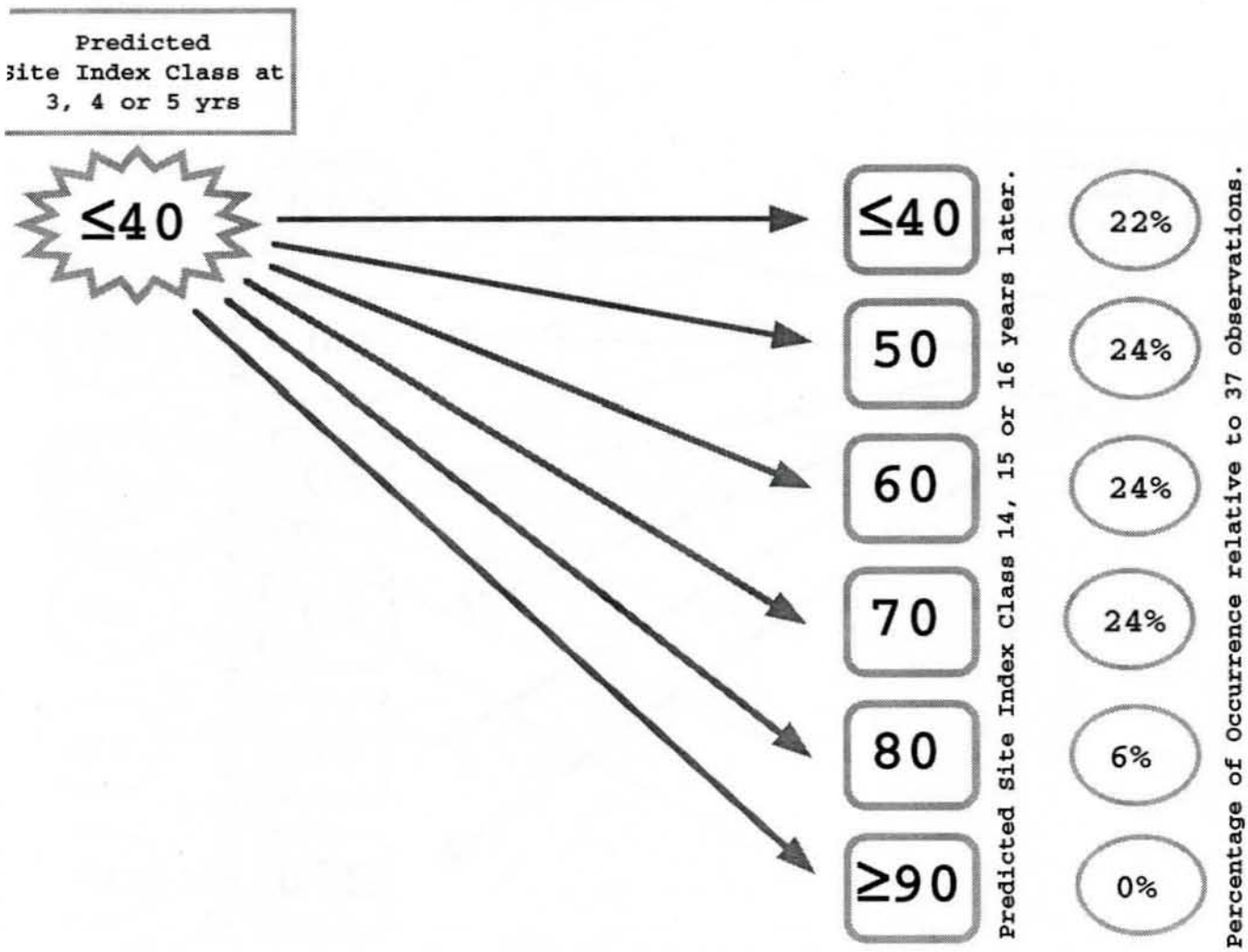
Fortunately, many of the tracks begin with initial measurements in plantations that were less than 5 years old.

These particular data were analyzed in this study.

The results are depicted on the next 6 pages.

An assessment of the reliability of using tree height values at ages 3, 4 or 5 years for estimating the ability of areas to grow loblolly pine plantations in East Texas, as measured by site index (base age 25 years).

Predicted site index class = ≤40 feet.
Based on 37 observations
at plantation ages 3, 4 or 5 years.



Reliability Assessment

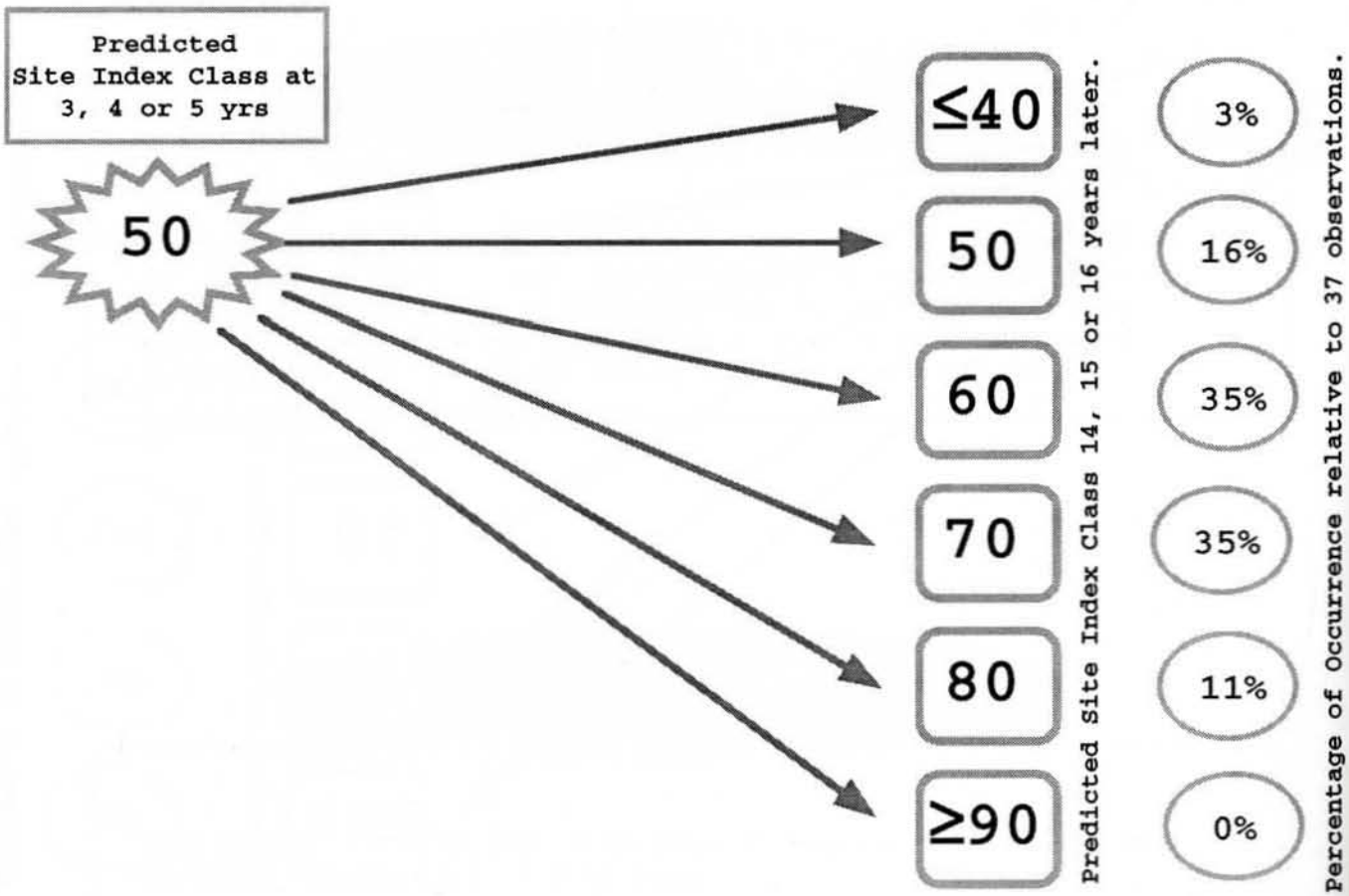
It appears that in over 75% of these plantations initially expected to have a low ability to grow pines, the sites may actually have a higher ability to grow trees - perhaps 10, 20 or even 30 feet higher.

Reliability of using age and height pairs in these 3, 4 and 5 year old plantations might be questionable.

Reliance on these initial site index estimates for management planning might result in unexpected wood surpluses occurring at time of harvests.

An assessment of the reliability of using tree height values at ages 3, 4 or 5 years for estimating the ability of areas to grow loblolly pine plantations in East Texas, as measured by site index (base age 25 years).

Predicted site index class = 50 feet.
Based on 37 observations
at plantation ages 3, 4 or 5 years.



Reliability Assessment

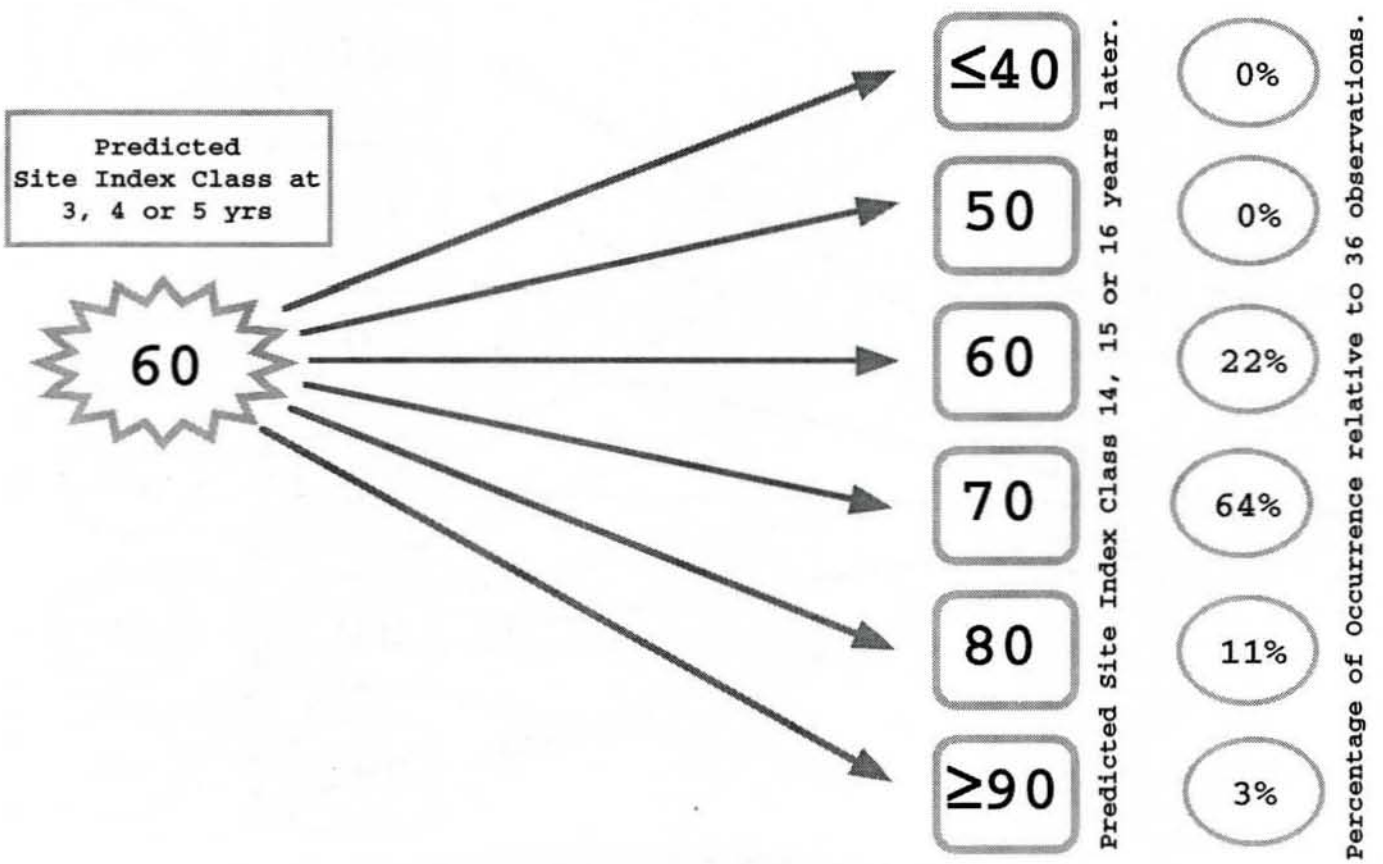
It appears that in 70% of these plantations initially expected to exist on site index 50 feet areas, the sites may actually have a higher ability to grow trees 10 or 20 feet taller in height.

Reliability of using age and height pairs in these 3, 4 and 5 year old plantations might be dubious.

Reliance on these initial site index estimates for management planning might result in unexpected wood surpluses occurring at time of harvests.

An assessment of the reliability of using tree height values at ages 3, 4 or 5 years for estimating the ability of areas to grow loblolly pine plantations in East Texas, as measured by site index (base age 25 years).

Predicted site index class = 60 feet.
Based on 36 observations
at plantation ages 3, 4 or 5 years.



Reliability Assessment

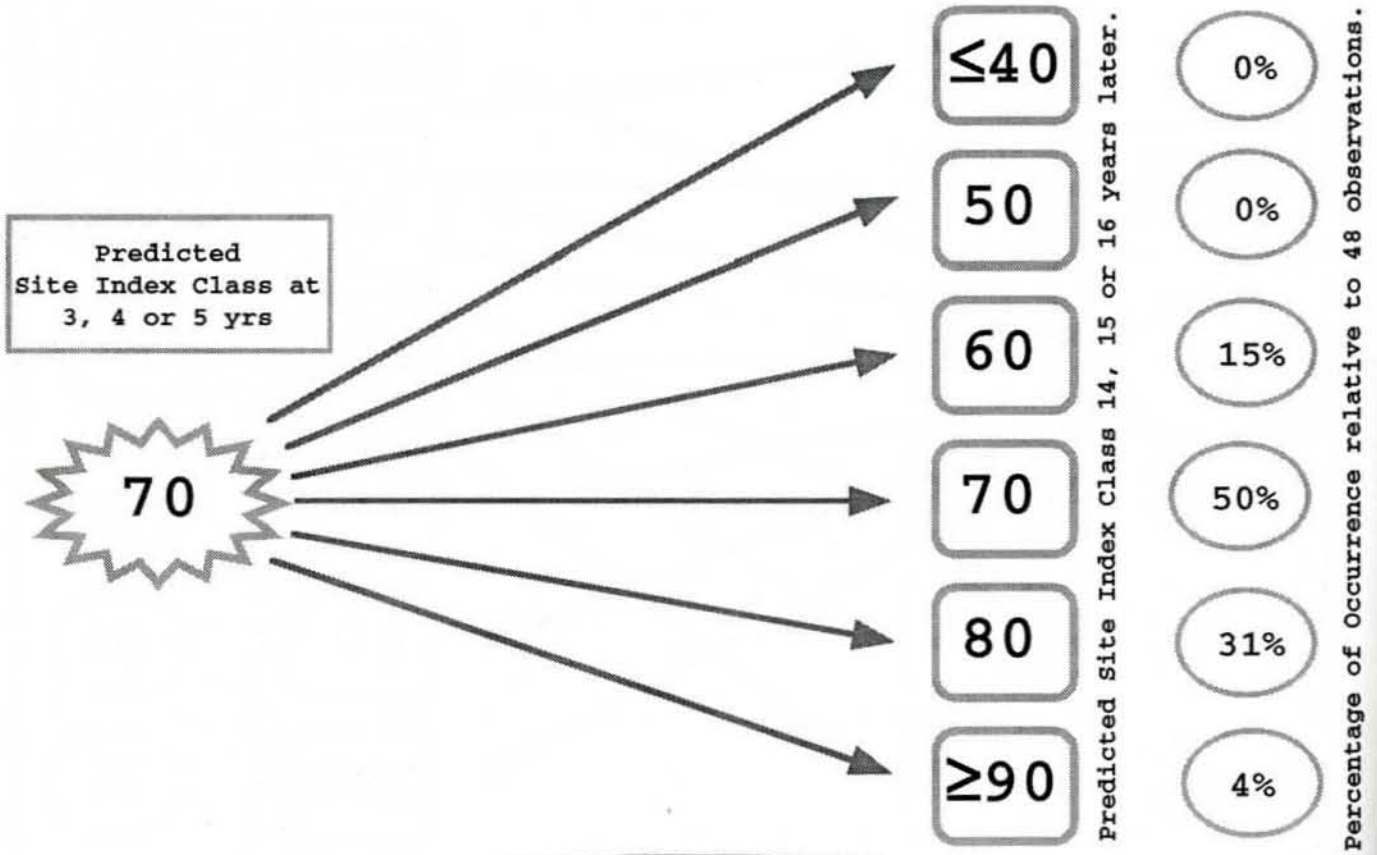
It appears that in most of these plantations with a predicted site index = 60 feet, the sites may actually be 60 feet or, or more likely, 70 feet.

Reliability of using age and height pairs in these 3, 4 and 5 year old plantations might be within acceptable limits.

However, reliance on these initial site index estimates for management planning might result in wood surpluses at the harvests of some plantations.

An assessment of the reliability of using tree height values at ages 3, 4 or 5 years for estimating the ability of areas to grow loblolly pine plantations in East Texas, as measured by site index (base age 25 years).

Predicted site index class = 70 feet.
Based on 48 observations
at plantation ages 3, 4 or 5 years.



Reliability Assessment

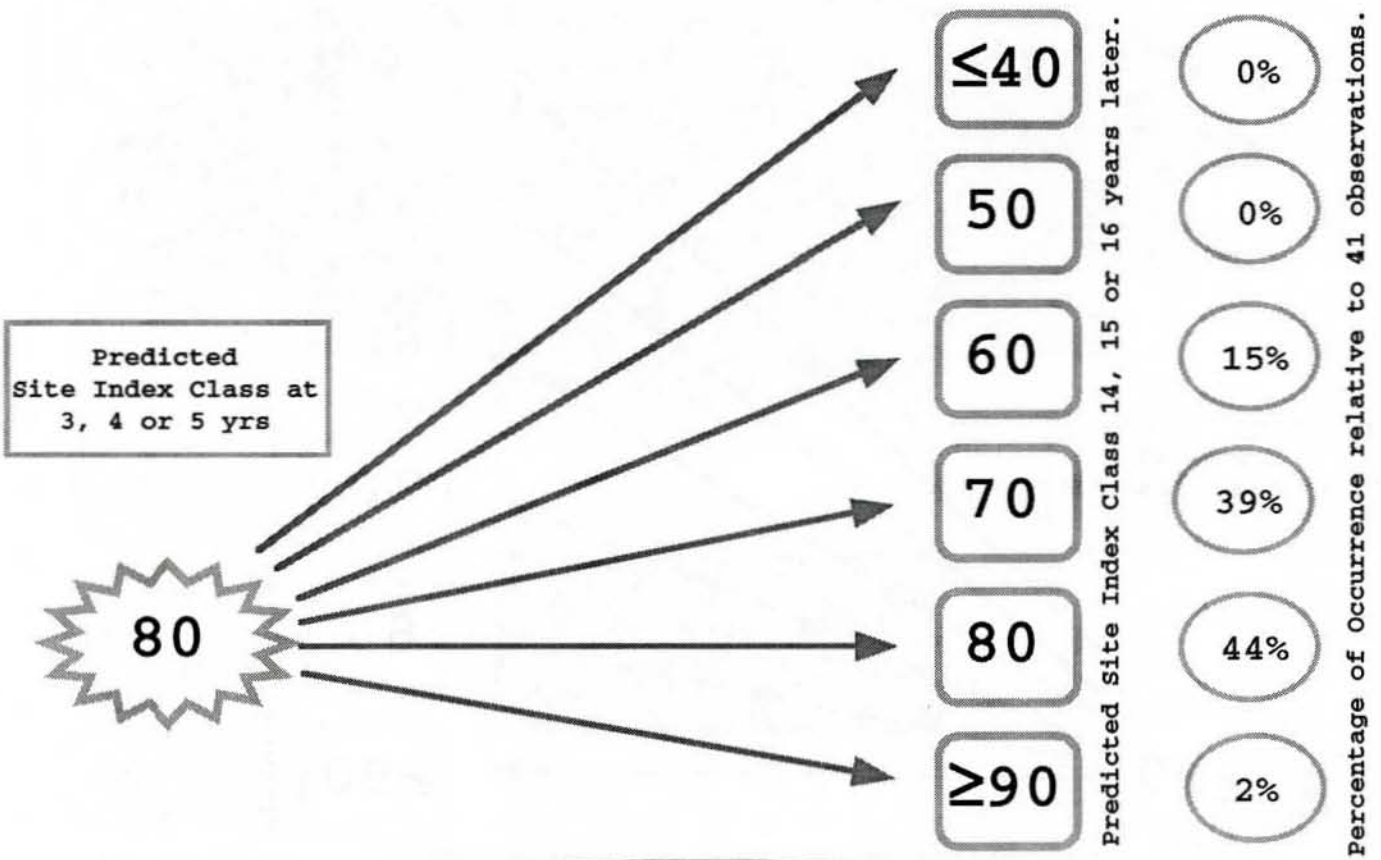
On these areas with initial site index estimates of 70 feet, it appears that 50% may actually have that productivity value. However, an error of about plus or minus 10 feet is apparent.

Reliability of using age and height pairs in these 3, 4 and 5 year old plantations might be justifiable.

On the average, reliance on these initial site index estimates for management planning might result in expected wood flows occurring at time of harvests.

An assessment of the reliability of using tree height values at ages 3, 4 or 5 years for estimating the ability of areas to grow loblolly pine plantations in East Texas, as measured by site index (base age 25 years).

Predicted site index class = 80 feet.
Based on 41 observations
at plantation ages 3, 4 or 5 years.



Reliability Assessment

It appears that the initial site index estimate of 80 feet is reasonable about 44% of the times with overestimation of 10 or 20 feet occurring on about 54% of the areas.

Reliability of using age and height pairs in these 3, 4 and 5 year old plantations might be cautiously acceptable.

Reliance on these initial site index estimates for management planning might result in unexpected wood shortages occurring at time of harvests in perhaps about half of the cases.

Two Research Questions

What is the age of maximum mean annual increment - as measured by yield per acre?

Is the timing influenced by site index?

The Data/The Analysis/The Plottings

Observations from the East Texas Pine Plantation Research Project were available for analysis in this study. We limited the observations to site index classes 60, 70 and 80 feet. And age classes were set at three-year intervals.

For each combination of site index and age class, an average observed cubic feet wood and bark total stem per acre was calculated.

Based on these values, MAI (mean annual increment) and CAI (current annual increment) were calculated.

The values (plus observed average trees per acre) are depicted in graphs on the next six pages.

Conclusions

Loblolly: From examination of the first three graphs, it appears that maximum MAI tends to occur between 20 - 26 years. It may be argued that the timing tends to decrease with decreasing site index.

Slash: In contrast, from examination of the last three graphs, it appears that maximum MAI between 12 - 26 years. An association with site index is difficult to determine due to fluctuating values.

For both species, the magnitude of yield per acre increases with increasing site index.

For both species, the magnitude of MAI increases with increasing site index.

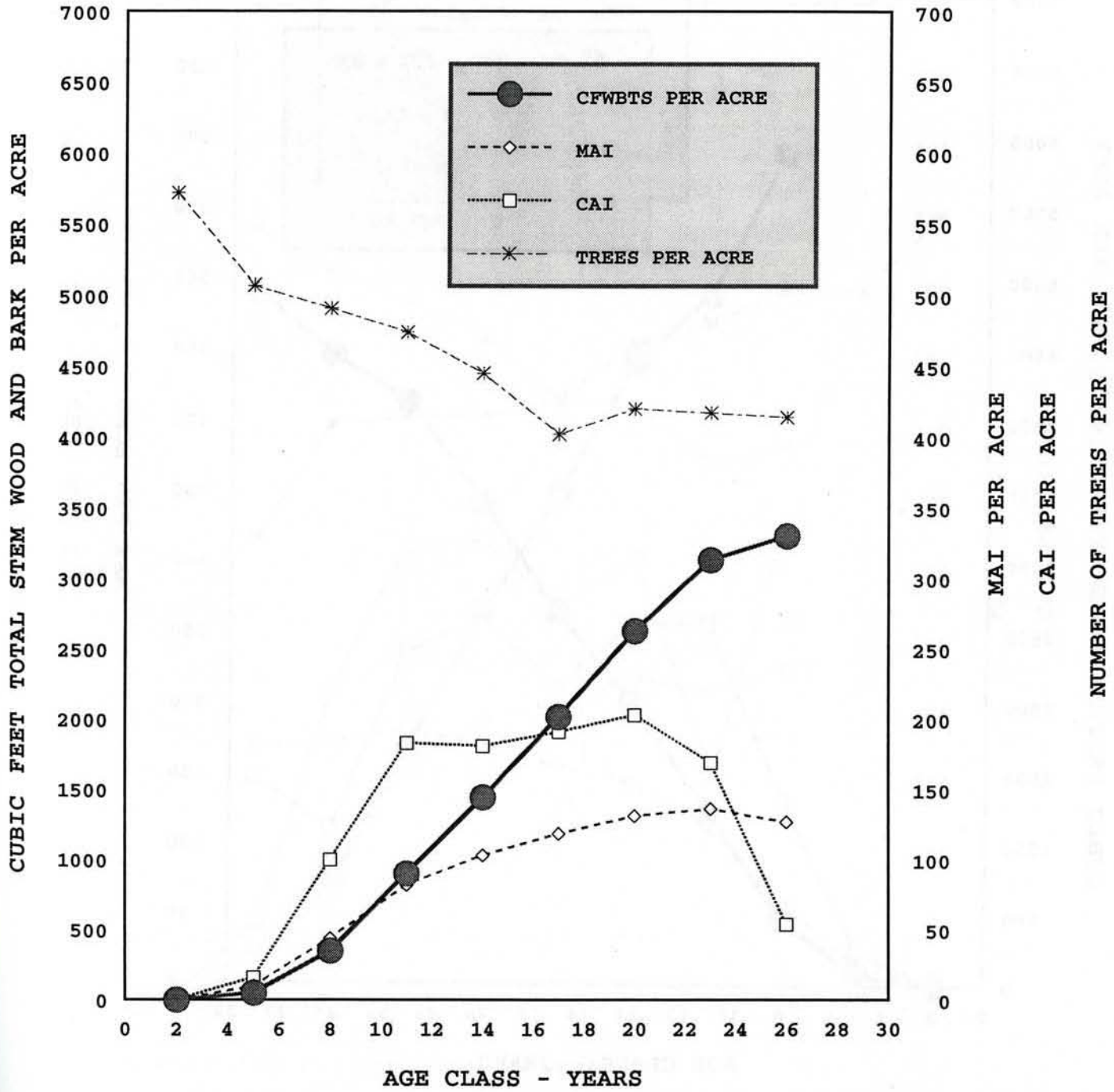
For both species, the character and nature of CAI is quite variable.

It may be concluded that site-specific management of planted pines in East Texas may be appropriate.

OBSERVED AVERAGE CUBIC FEET TOTAL STEM
WOOD AND BARK PER ACRE
LOBLOLLY PINE ... EAST TEXAS

SI 60 FEET (BASE AGE 25 YEARS)

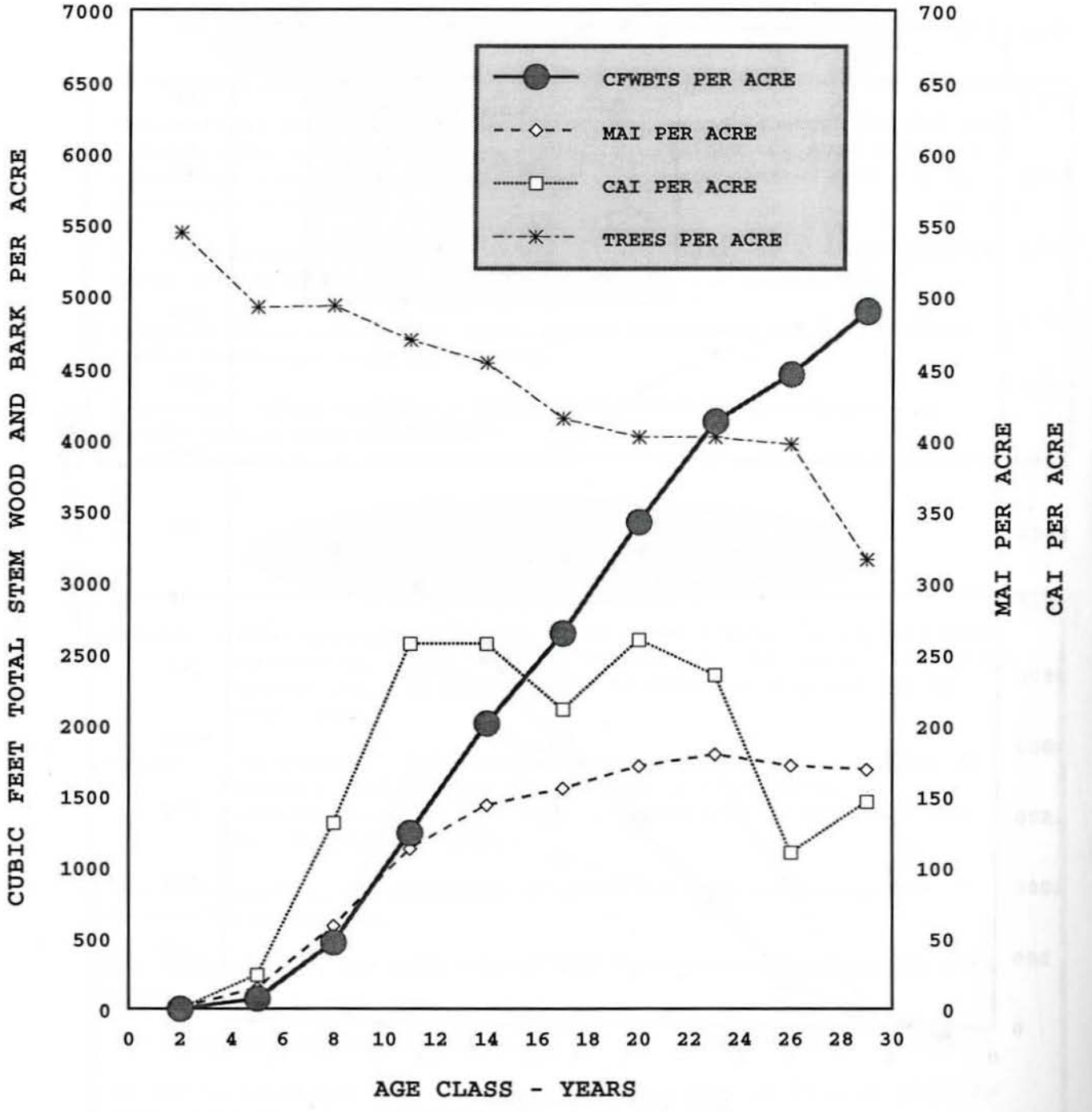
FOUR OBSERVED PLANTATION PARAMETERS ARE PLOTTED.



OBSERVED AVERAGE CUBIC FEET TOTAL STEM
WOOD AND BARK PER ACRE
LOBLOLLY PINE ... EAST TEXAS

SI 70 FEET (BASE AGE 25 YEARS)

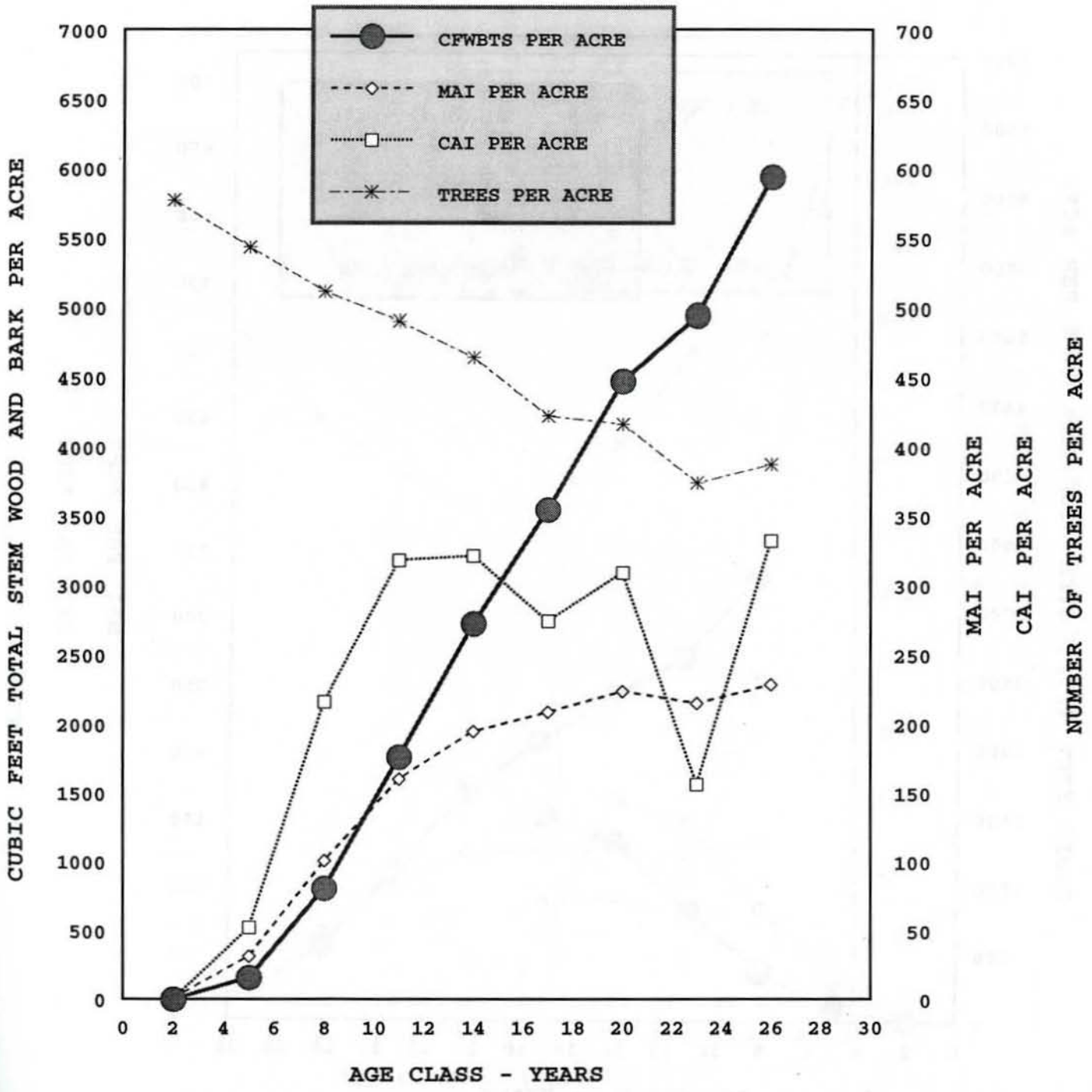
FOUR OBSERVED PLANTATION PARAMETERS ARE PLOTTED



OBSERVED AVERAGE CUBIC FEET TOTAL STEM
WOOD AND BARK PER ACRE
LOBLOLLY PINE ... EAST TEXAS

SI 80 FEET (BASE AGE 25 YEARS)

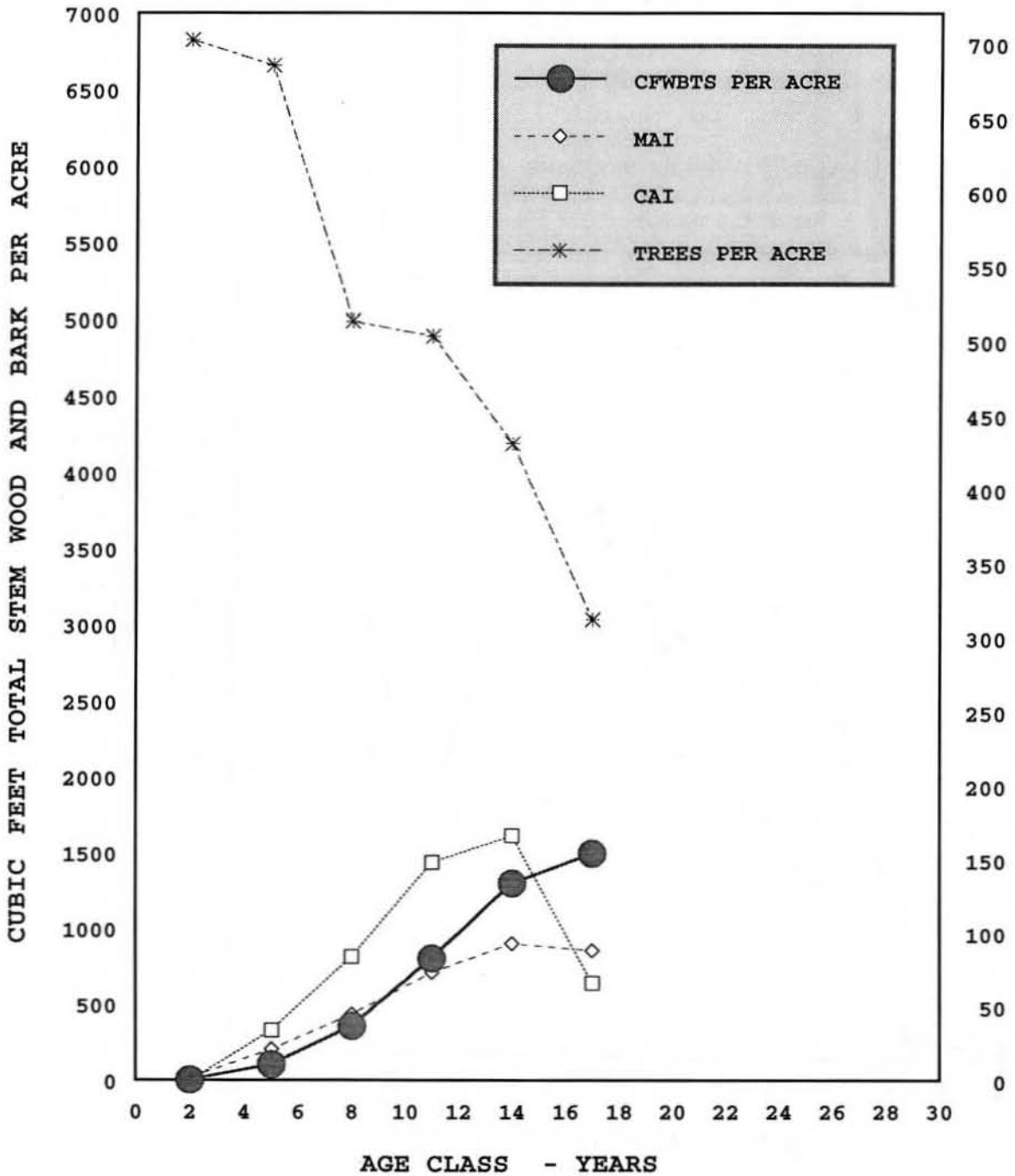
FOUR OBSERVED PLANTATION PARAMETERS ARE PLOTTED.



OBSERVED AVERAGE CUBIC FEET TOTAL STEM
WOOD AND BARK PER ACRE
SLASH PINE ... EAST TEXAS

SI 60 FEET (BASE AGE 25 YEARS)

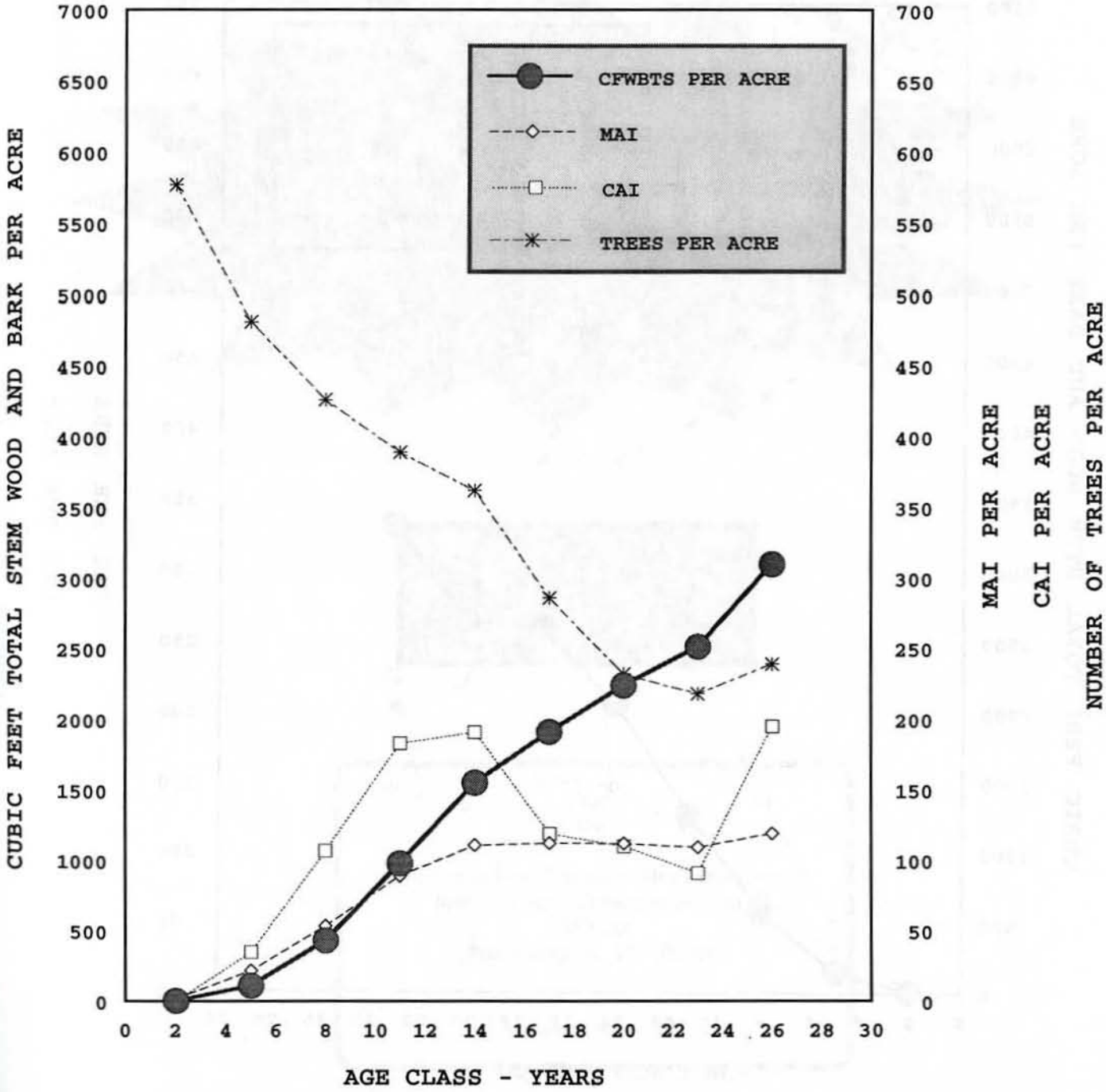
FOUR OBSEVERED PLANTATION PARAMETERS ARE PLOTTED



OBSERVED AVERAGE CUBIC FEET TOTAL STEM
WOOD AND BARK PER ACRE
SLASH PINE ... EAST TEXAS

SI 70 FEET (BASE AGE 25 YEARS)

FOUR OBSERVED PLANTATION PARAMETERS ARE PLOTTED.



OBSERVED AVERAGE CUBIC FEET TOTAL STEM
WOOD AND BARK PER ACRE
SLASH PINE ... EAST TEXAS

SI 80 FEET (BASE AGE 25 YEARS)

FOUR OBSERVED PLANTATION PARAMETERS ARE PL0TTED.