

# Hagner experiments status after 22 years

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# Hagner experiments

- “Liberich” liberation thinning, enrichment planting (in Swedish naturkultur)
- Principle: “optimizing the net present value at each site of the forest” (=do what’s best at tree and tree group level)
- Hagner: harvest large trees, manage remaining trees, planting if needed

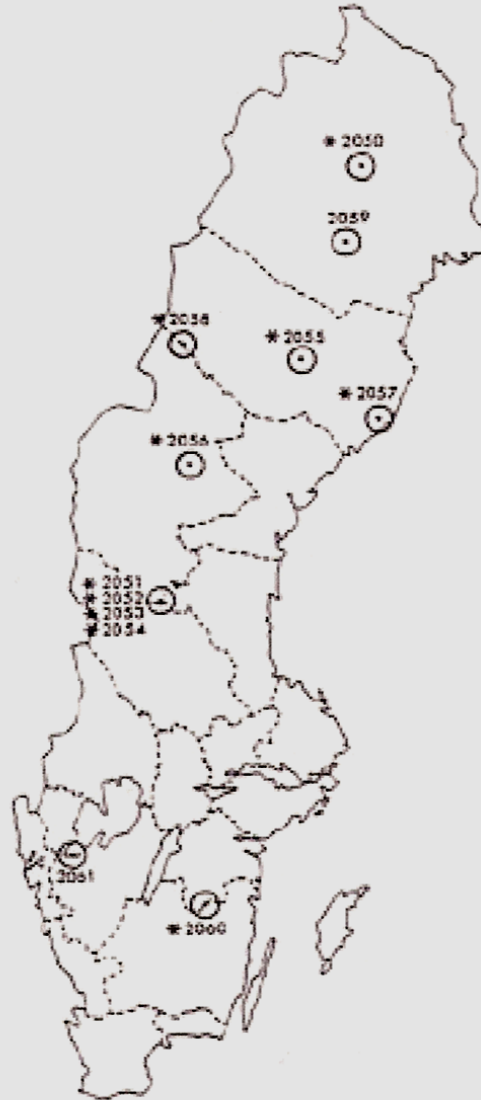
# Hagner experiments

## Trial

- Several blocks of 10 ha mainly in northern Sweden, spruce and pine stands
- Established in the late 1980's
- Measured before and after harvest, and 5, 10 and 22 years after harvest
- 4 parcels/block representing different treatments

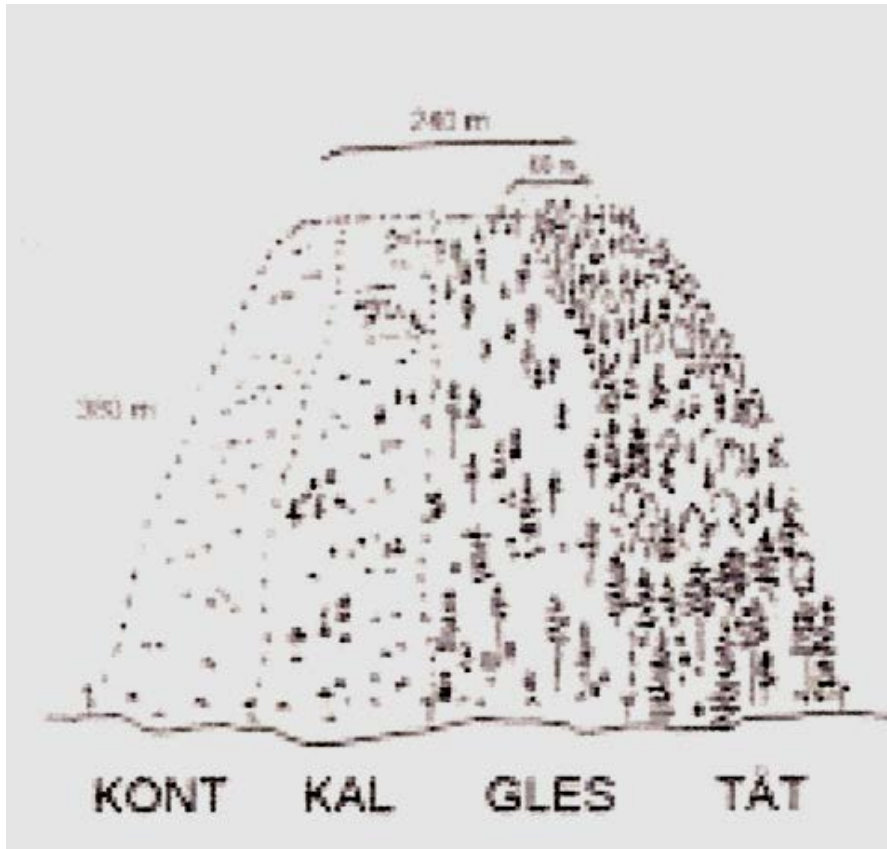
Block	Benämning
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2050	Harrejaur
2051	Dalkarlsberget
2052	Dalkarlsberget
2053	Dalkarlsberget
2054	Dalkarlsberget
2055	Barjasen
2056	Selkroksredden
2057	Åliden
2058	Sutme
2059	Piellovare
2060	Kråkrödjan



-trial, series of block

# Treatments



- CC= control, clear cut, soil scarification, planting
- CC no soil scarification= advance growth and small trees remaining, no soil scarification, planting
- SPARSE= thinning from above, 75 % harvested, no soil scarification, planting
- DENSE= thinning from above, 45 % harvested no soil scarification, planting

# Hagner experiments measurements

- Circular plots ( $r=5.64$  and  $10$  m), 12 / parcell, in 4 plots seedlings and trees are assigned by coordinates,  $5.64$  m plots were enlarged to  $10$  m at the third revision
- Seedlings, saplings ( $h>30$  cm,  $d<60$  mm)
  - Height
  - DBH
  - Damages
- Trees ( $DBH>59$  mm)
  - DBH
  - Damages
  - Height (30 %)

# 2051, 2052 Dalkarlsberget



Latitude 61  
Altitude 650 m  
Bilberry, heather  
3.3 m<sup>3</sup>/ha/yr  
Pine

# 2051, 2052 Dalkarlsberget

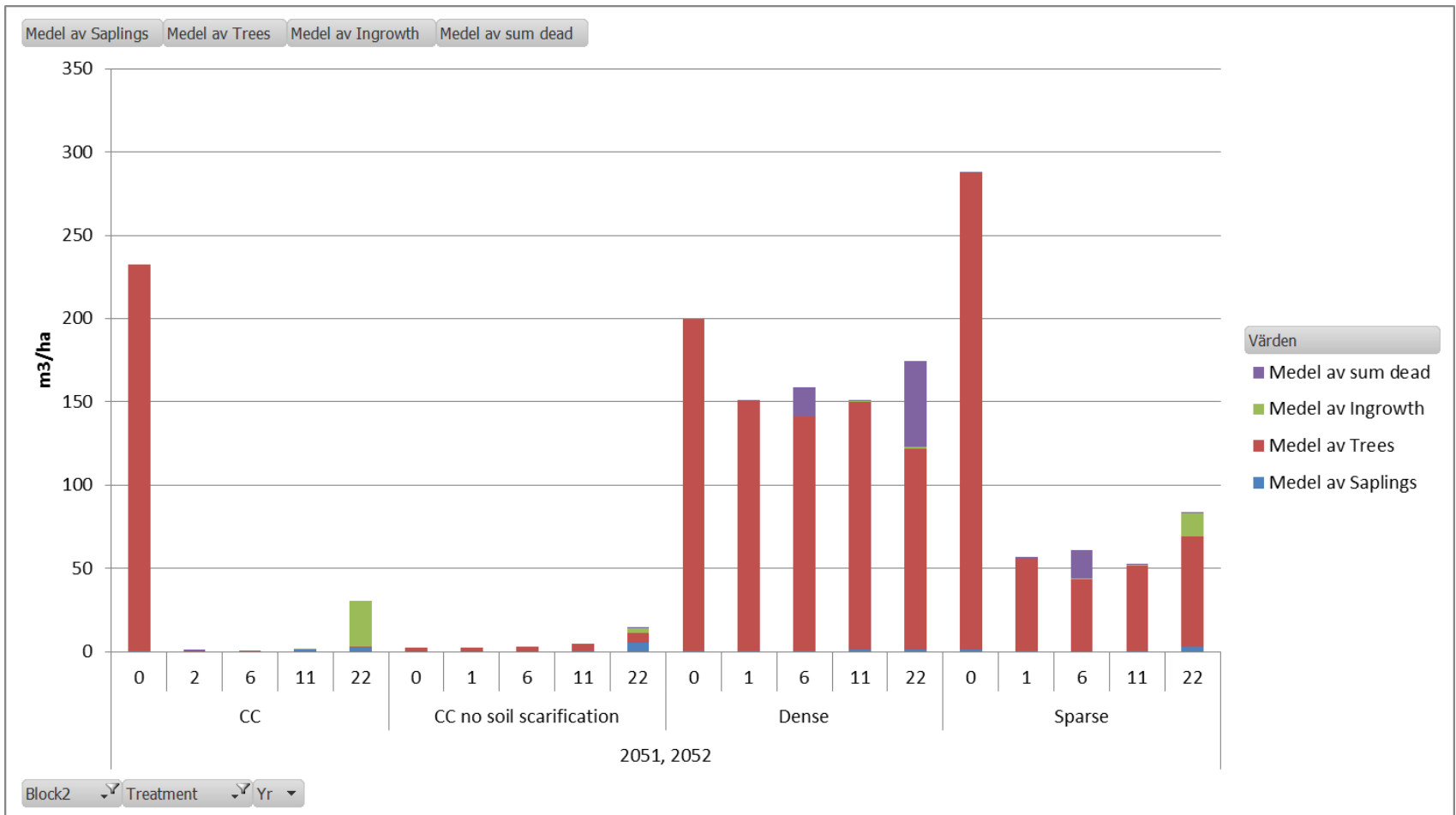
Treatment dense





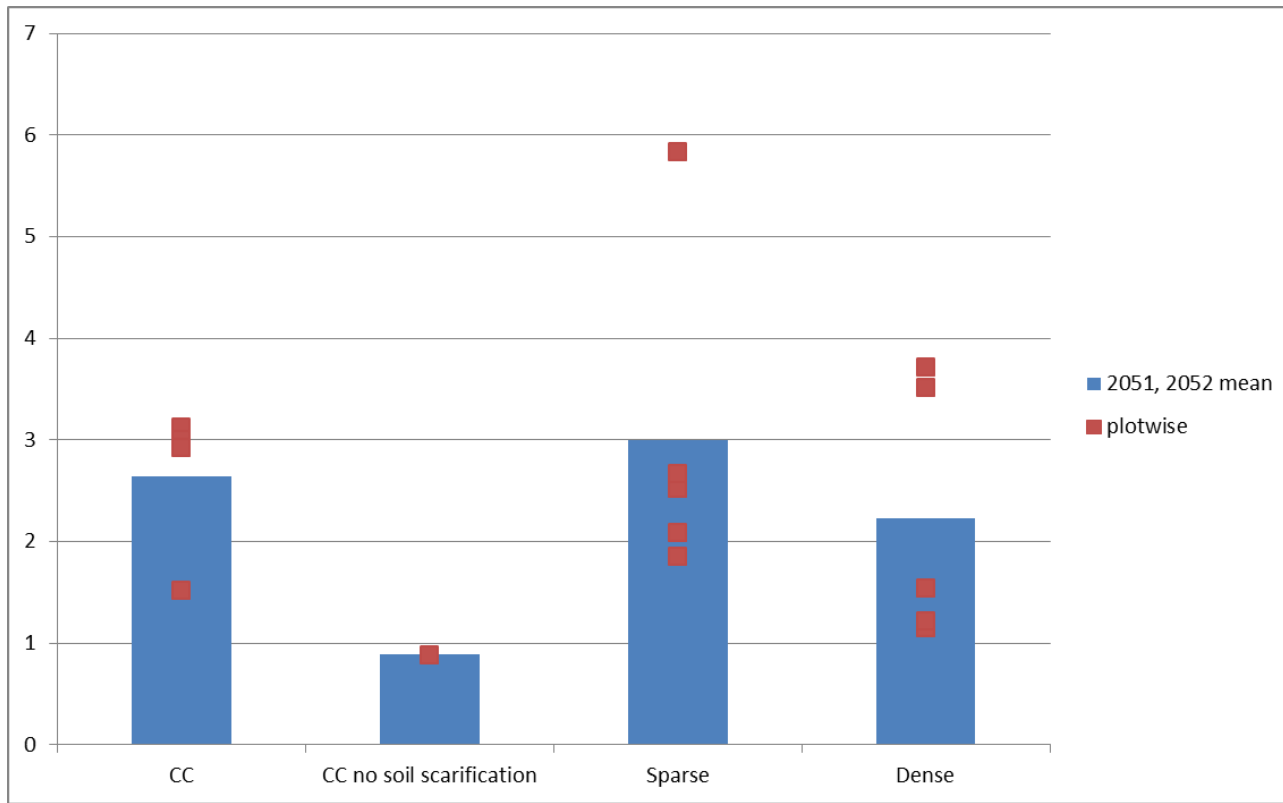
# Development

## Dalkarlsberget south



# Growth m<sup>3</sup>/ha/yr

11-22 years after harvest  
-Dalkarlsberget 2052, 2052



# 2053, 2054 Dalkarlsberget



Latitude 61  
Altitude 650 m  
Bilberry, heather  
3.3 m<sup>3</sup>/ha/yr  
Spruce

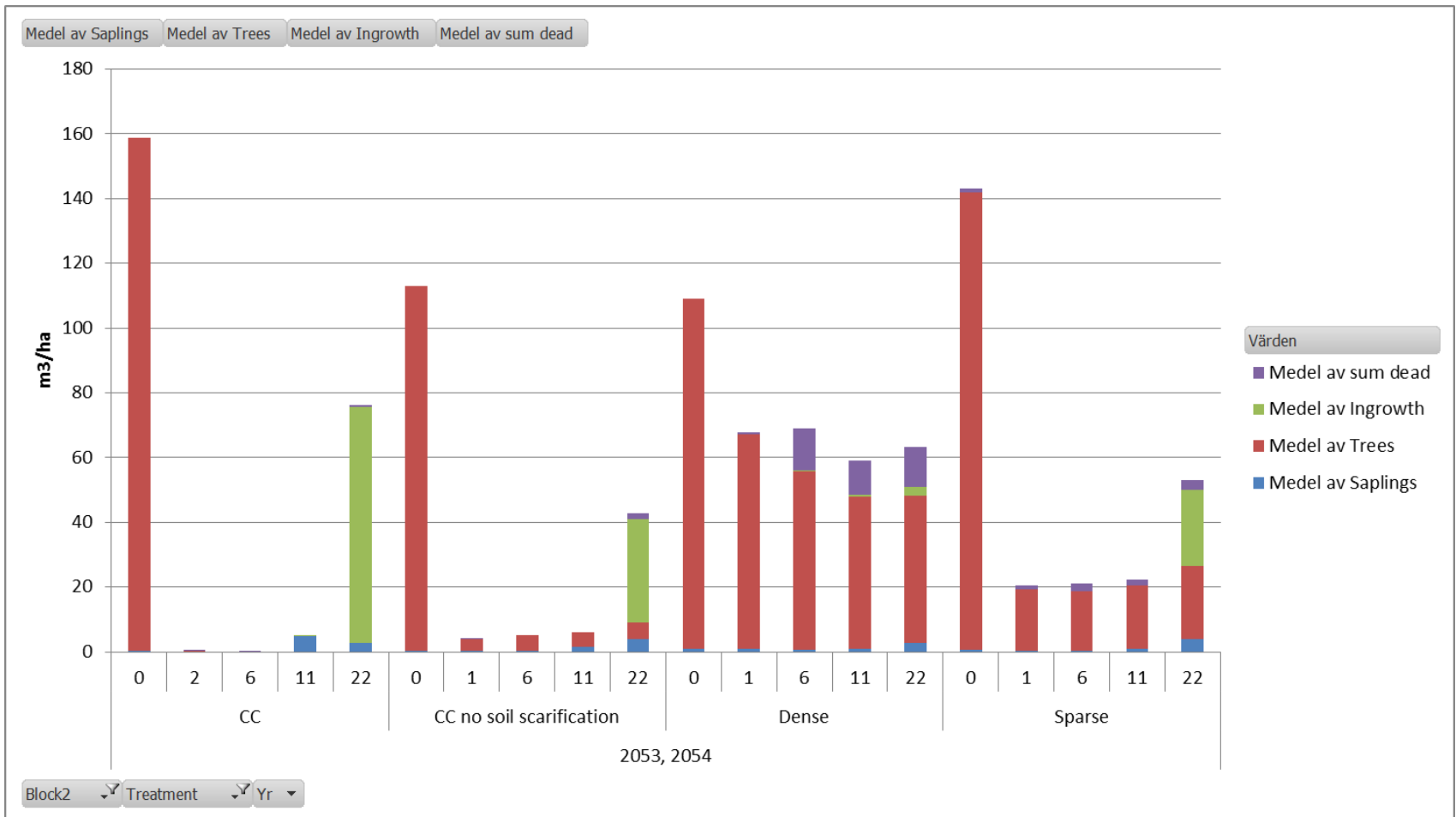
# 2053, 2054 Dalkarlsberget

Treatment dense



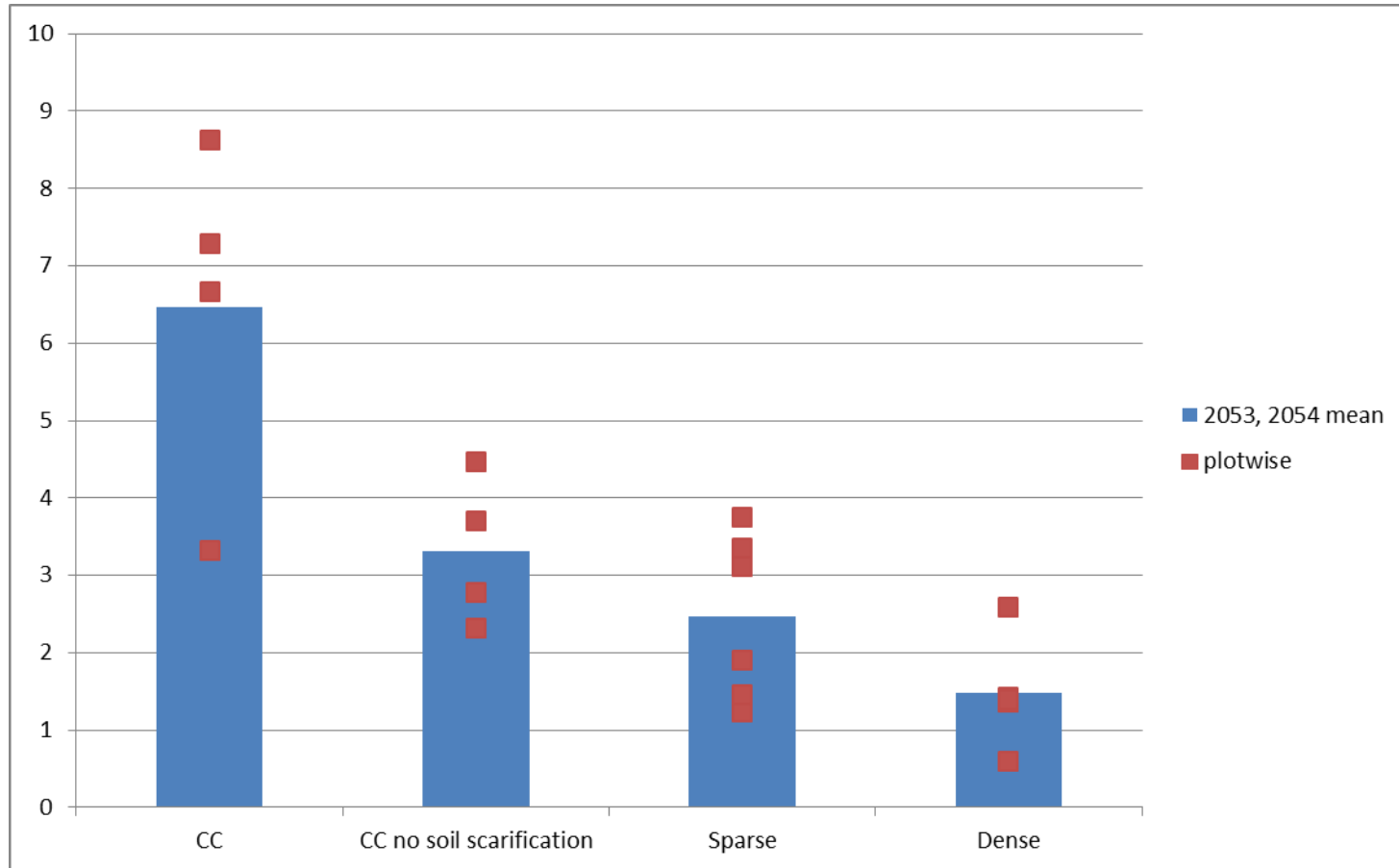
# Development

## Dalkarlsberget north



# Growth m<sup>3</sup>/ha/yr

11-22 years after harvest  
-Dalkarlsberget 2053, 2054



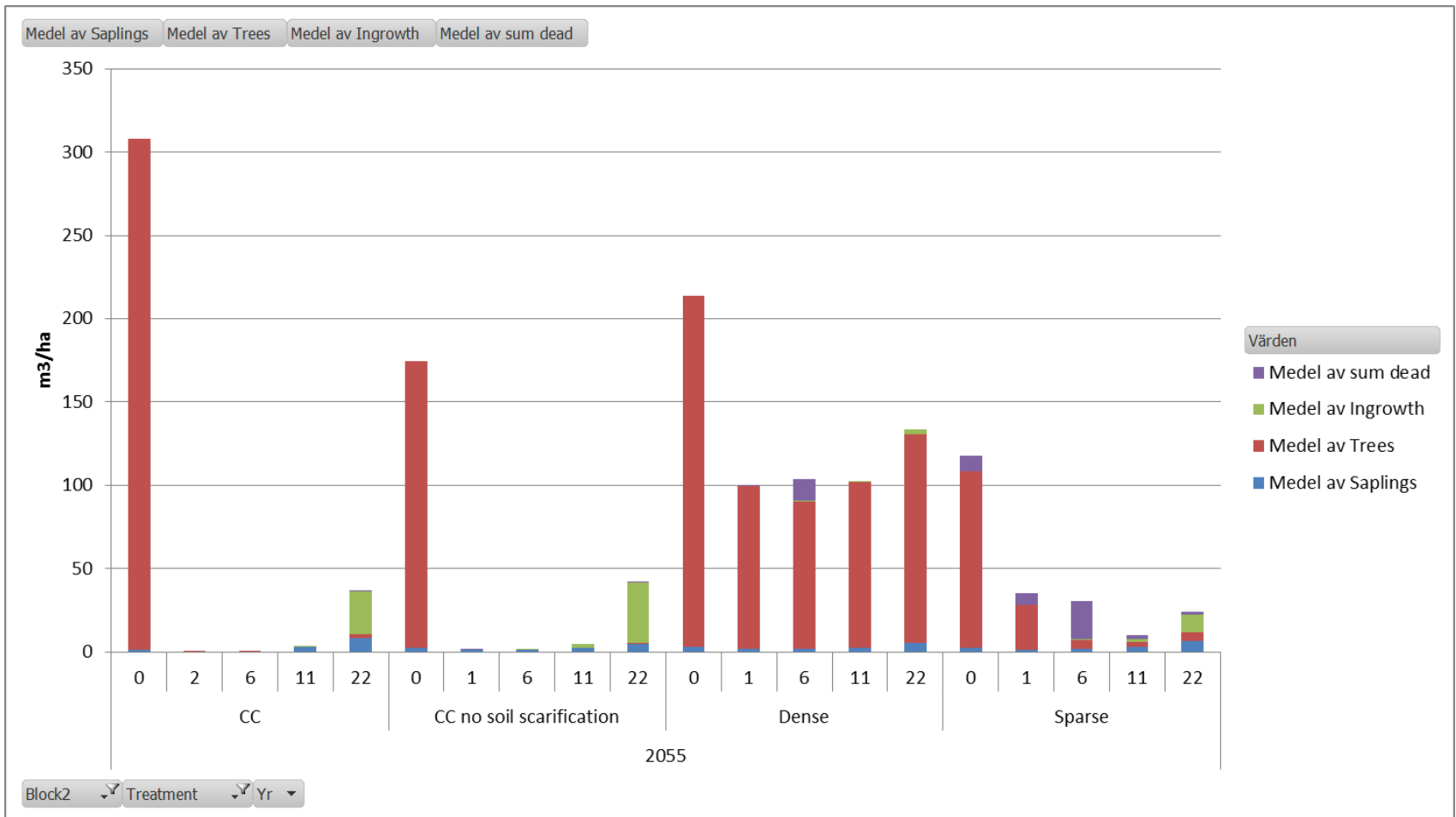
# 2055, Barjasen



Latitude 64  
Altitude 325  
Bilberry, lingonberry  
3,8 m<sup>3</sup>/ha/yr  
Pine, spruce

# Development

## Barjasen

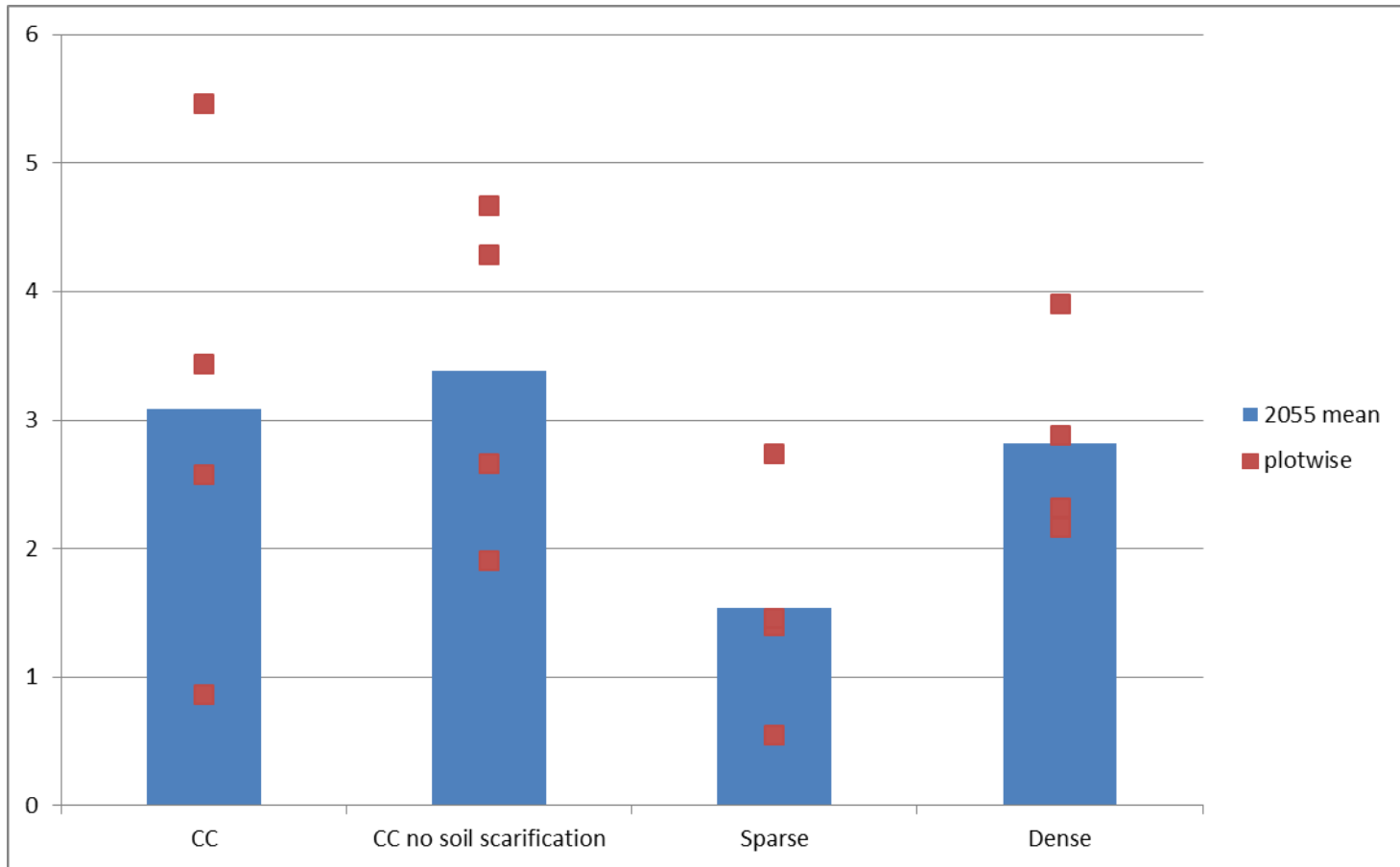




# Growth m<sup>3</sup>/ha/yr

## 11-22 years after harvest

### -Barjasen, 2055



# 2056, Selkroksredden



Latitude 63

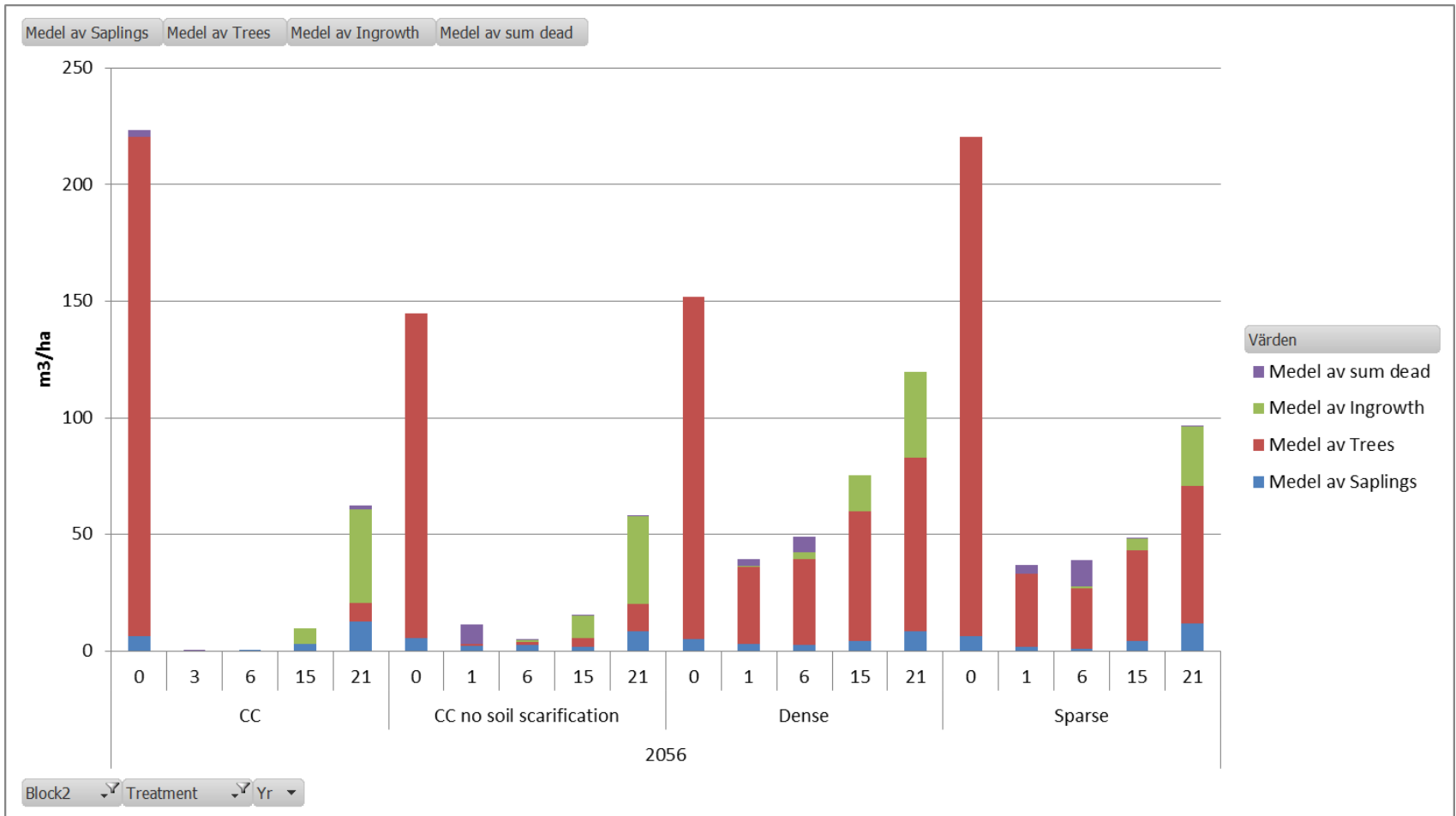
Altitude 375

Bilberry/ herb

4,3 m<sup>3</sup>/ha/yr

Spruce (pine, birch)

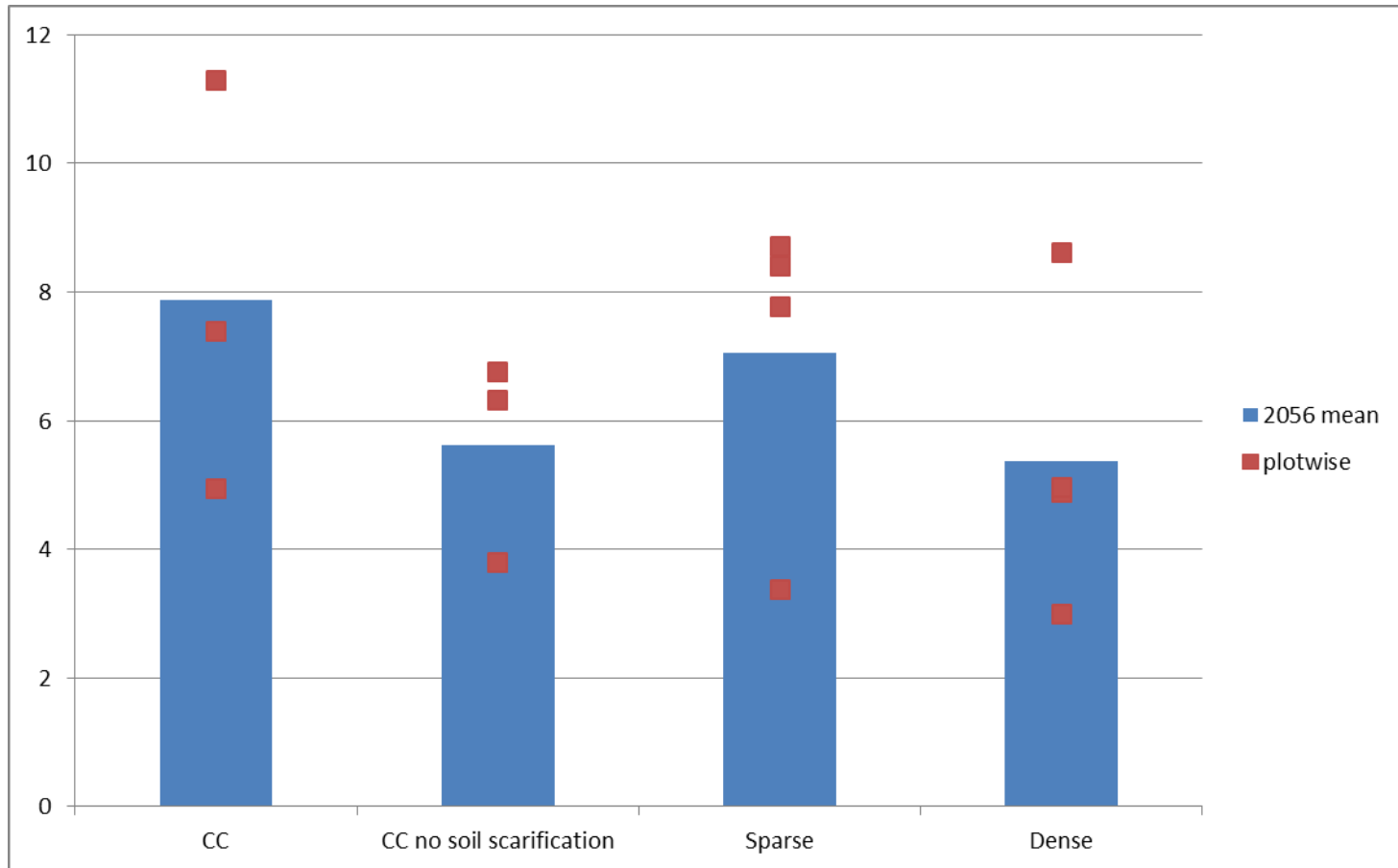
# Development Selkroksreddan



# Growth m<sup>3</sup>/ha/yr

## 15-21 years after harvest

### -Selkroksredden 2056



# 2057, Åliden



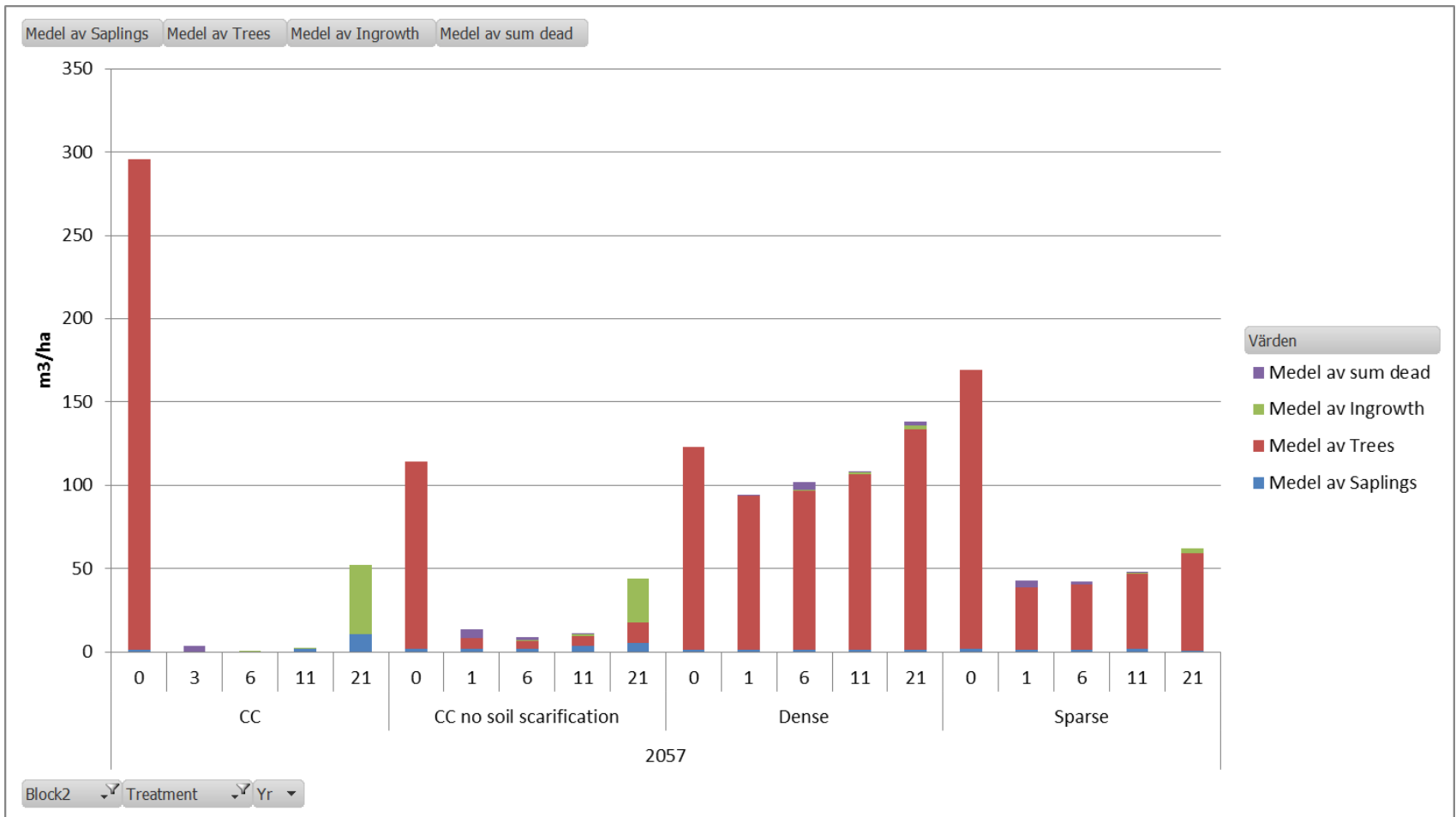
Latitude 64  
Altitude 155  
Bilberry  
3,9 m<sup>3</sup>/ha/yr

# Åliden, 2057

clearcut with and without soil scarification



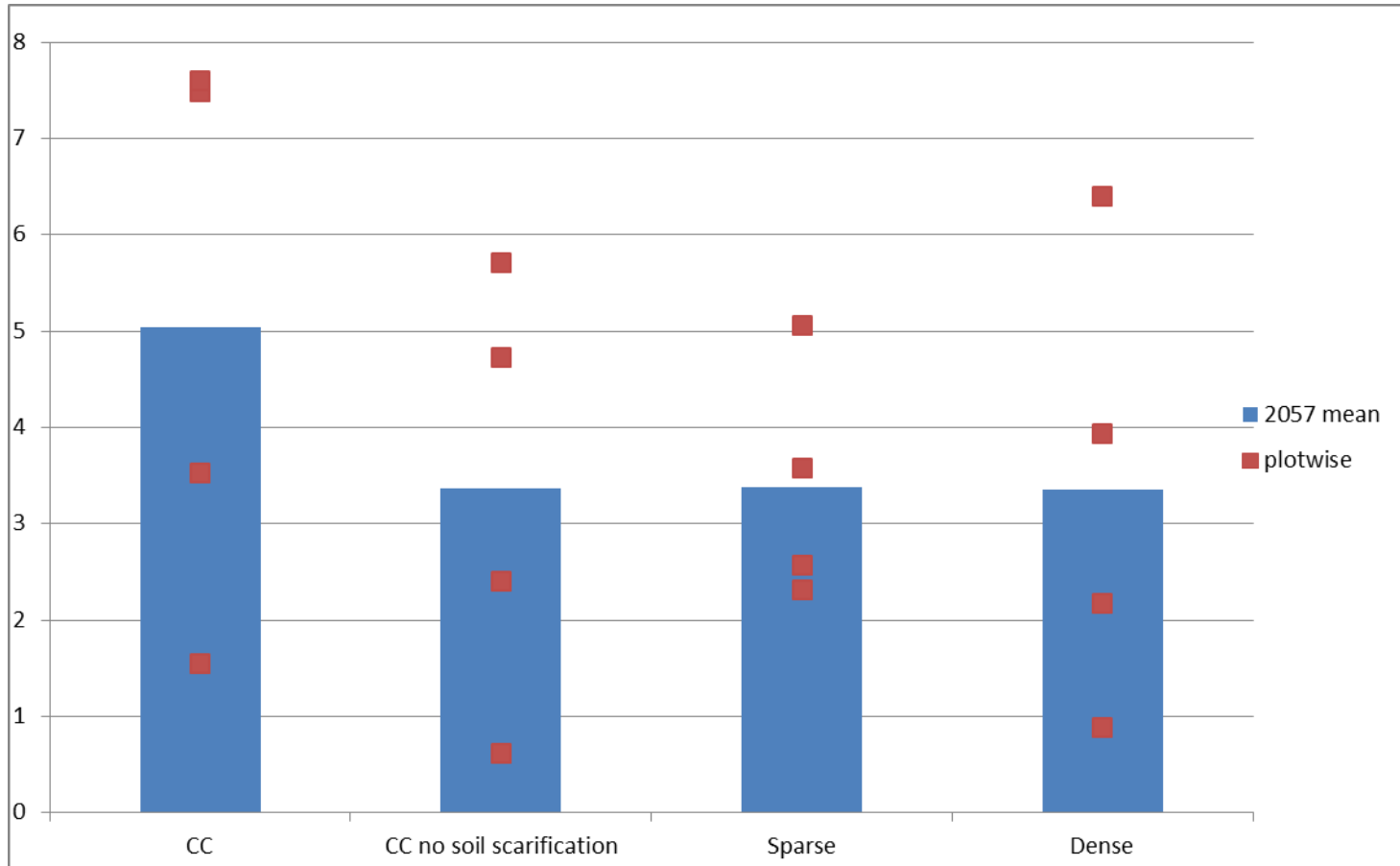
# Development Åliden



# Growth m<sup>3</sup>/ha/yr

## 11-21 years after harvest

### -Åliden 2057



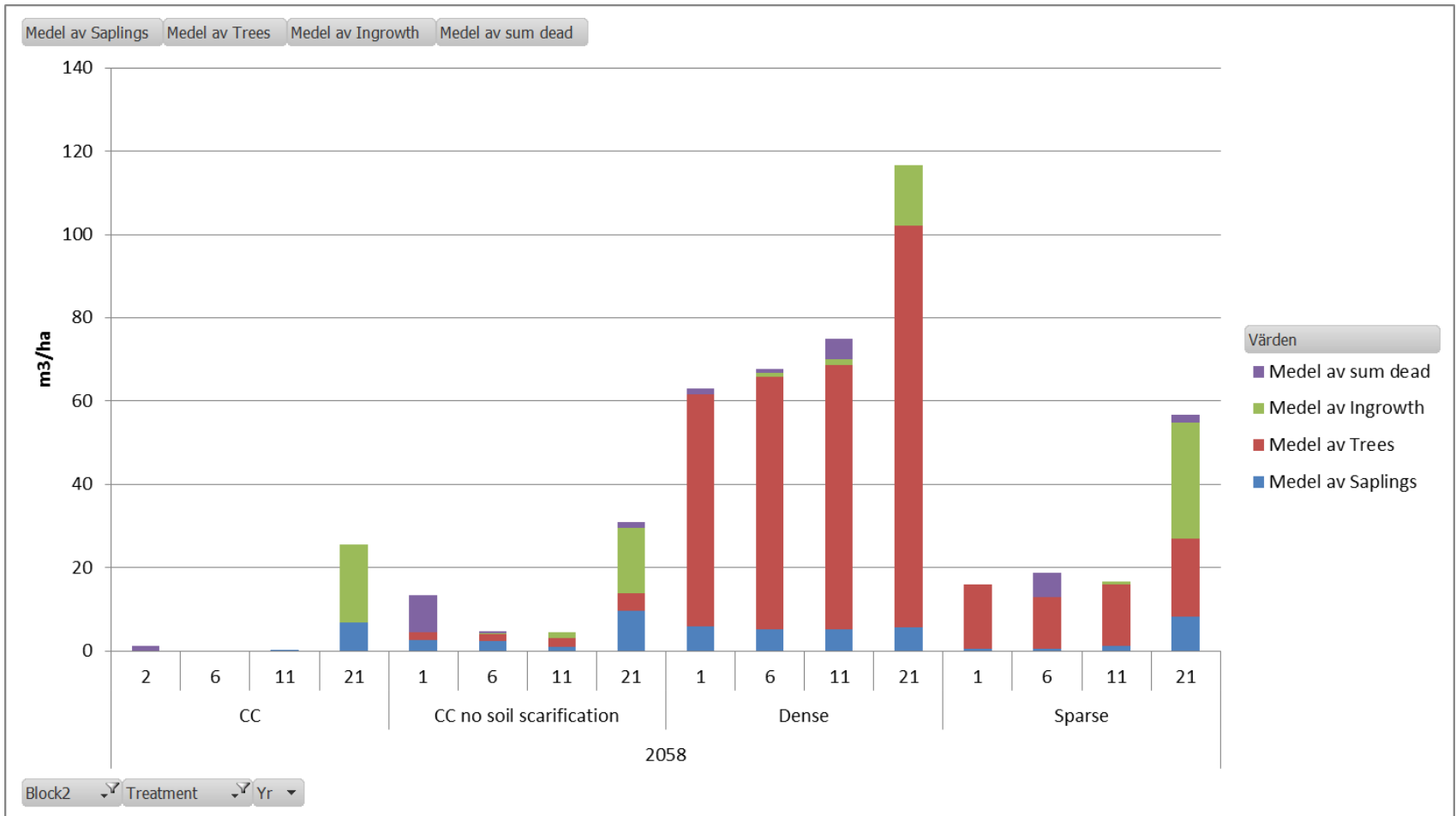


# 2058, Borgafjäll



Latitude 64  
Altitude 550 m  
Bilberry/herbs  
3.5 m<sup>3</sup>/ha/yr

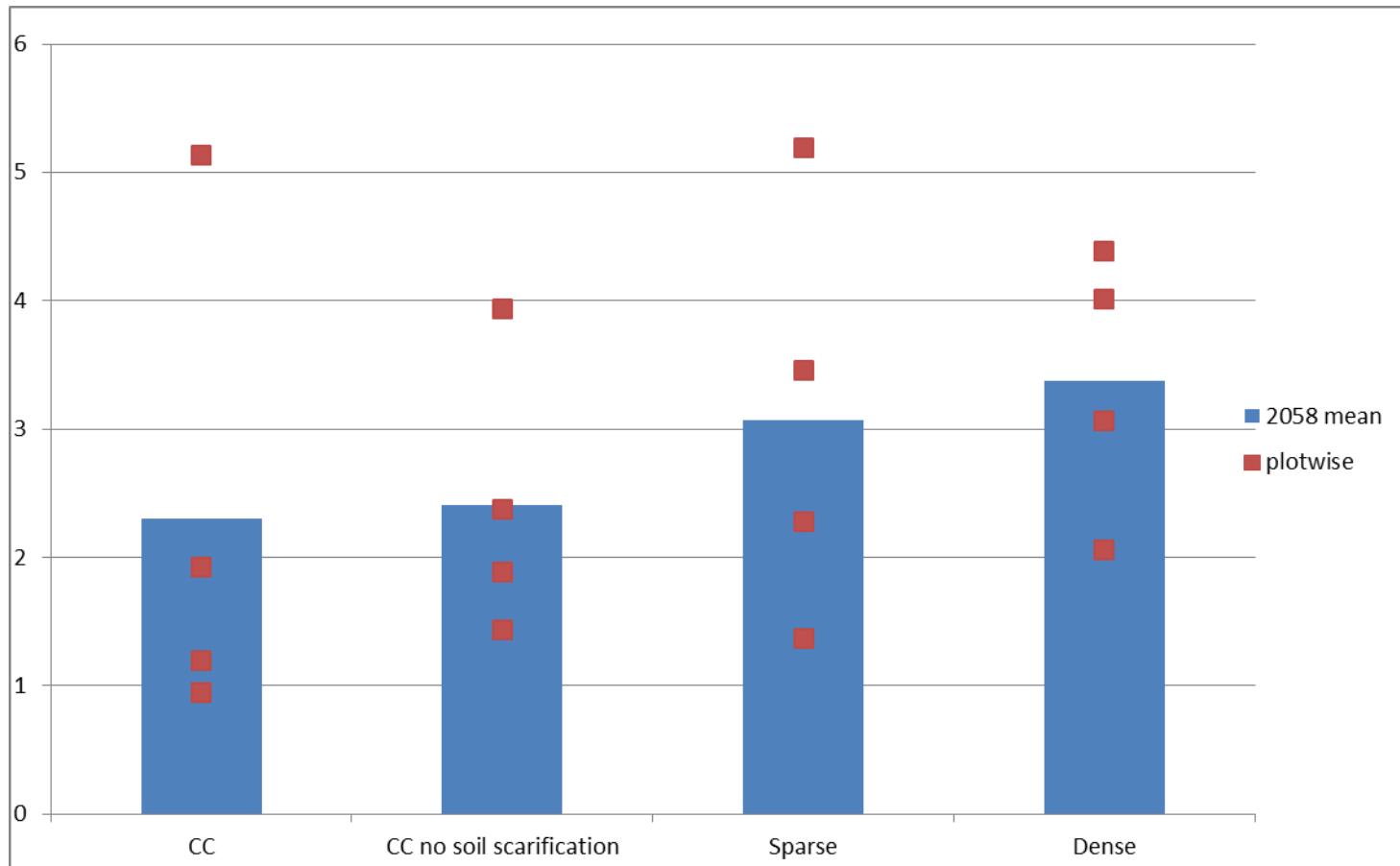
# Development Borgafjäll



# Growth m<sup>3</sup>/ha/yr

## 11-22 years after harvest

### -Borgafjäll 2058

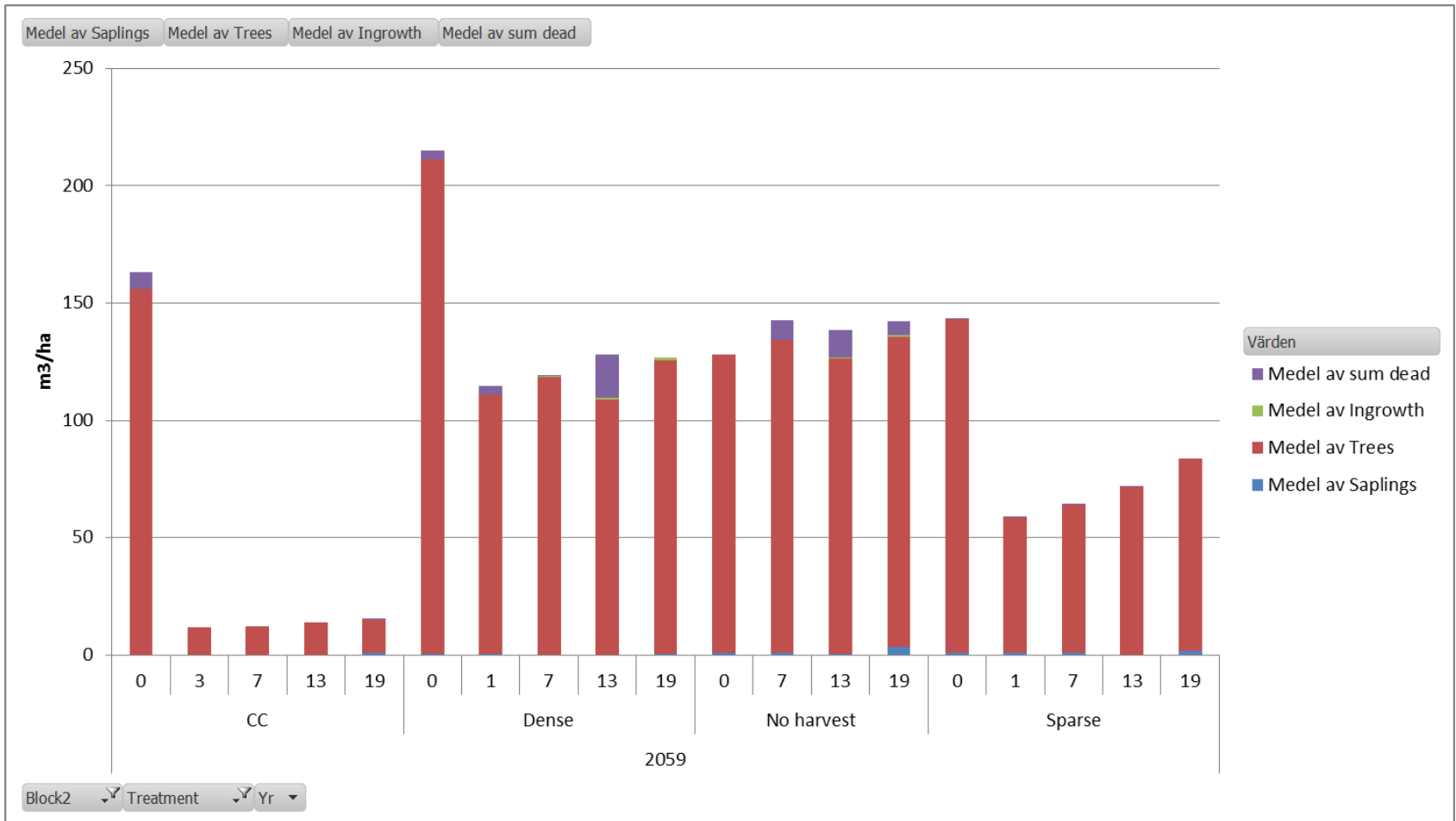


# 2059, Piellovare



Latitude 66  
Altitude 375 m  
Bilberry, lingonberry  
3,0 m<sup>3</sup>/ha/yr

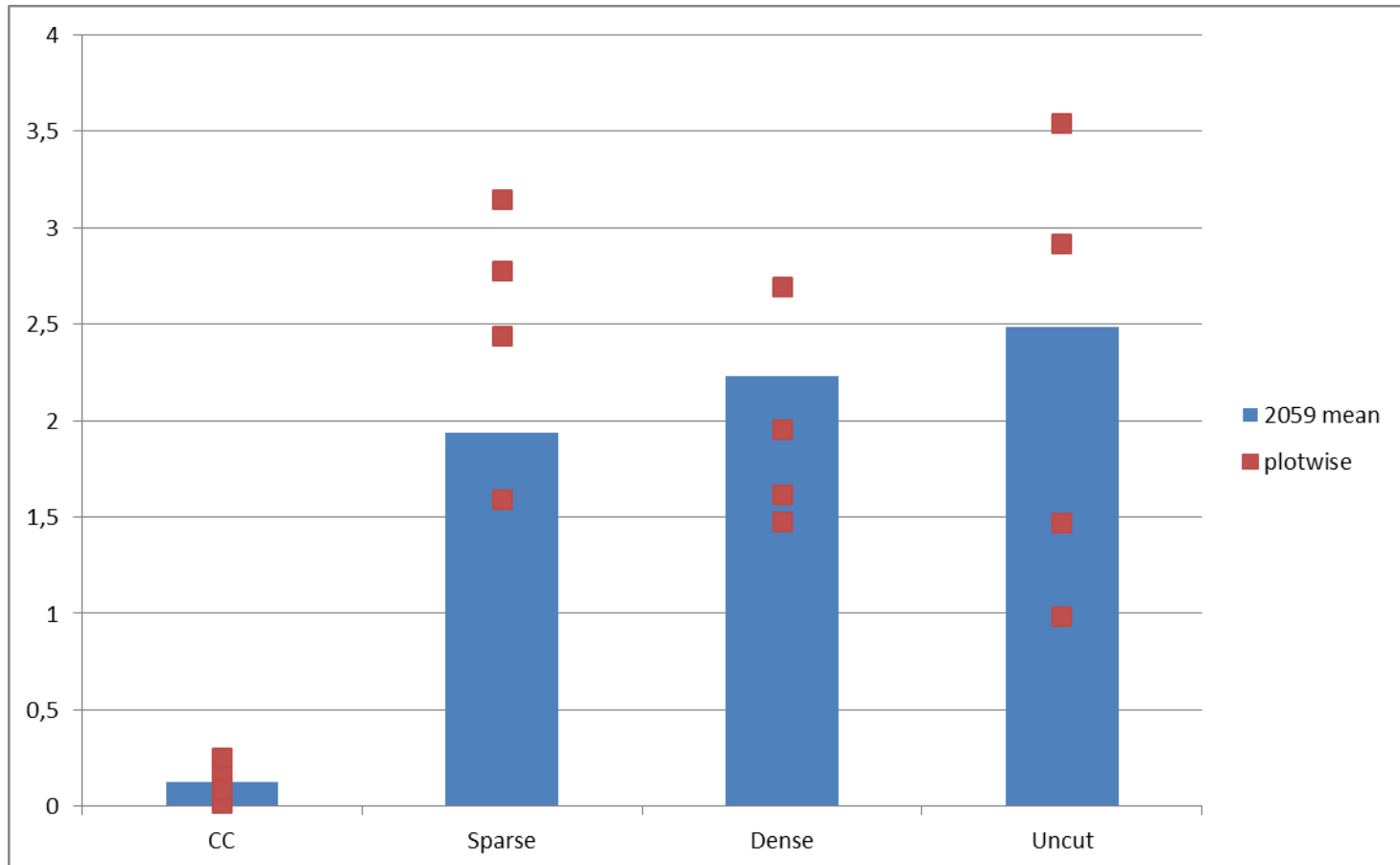
# Development Piellovare



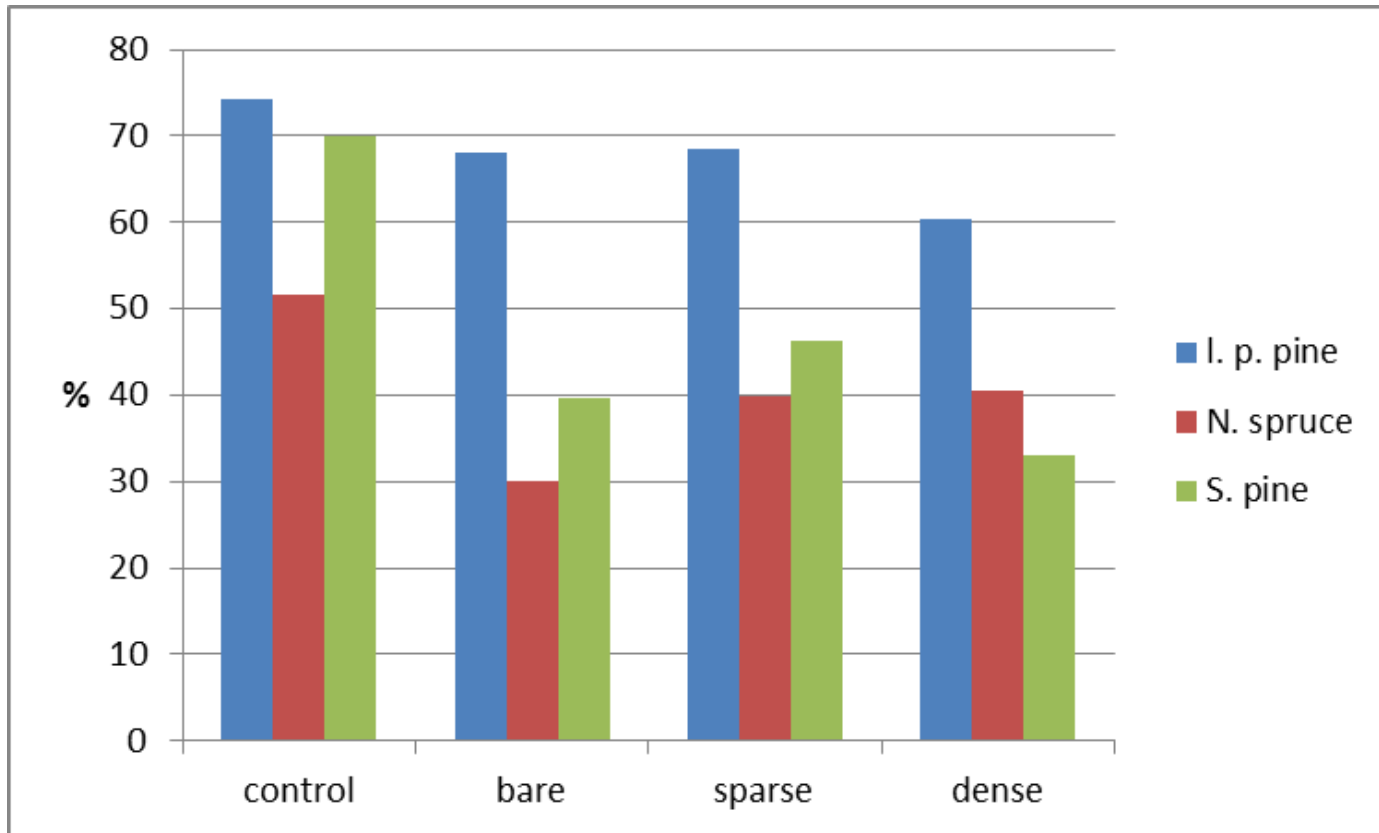
# Growth m<sup>3</sup>/ha/yr

## 13-19 years after harvest

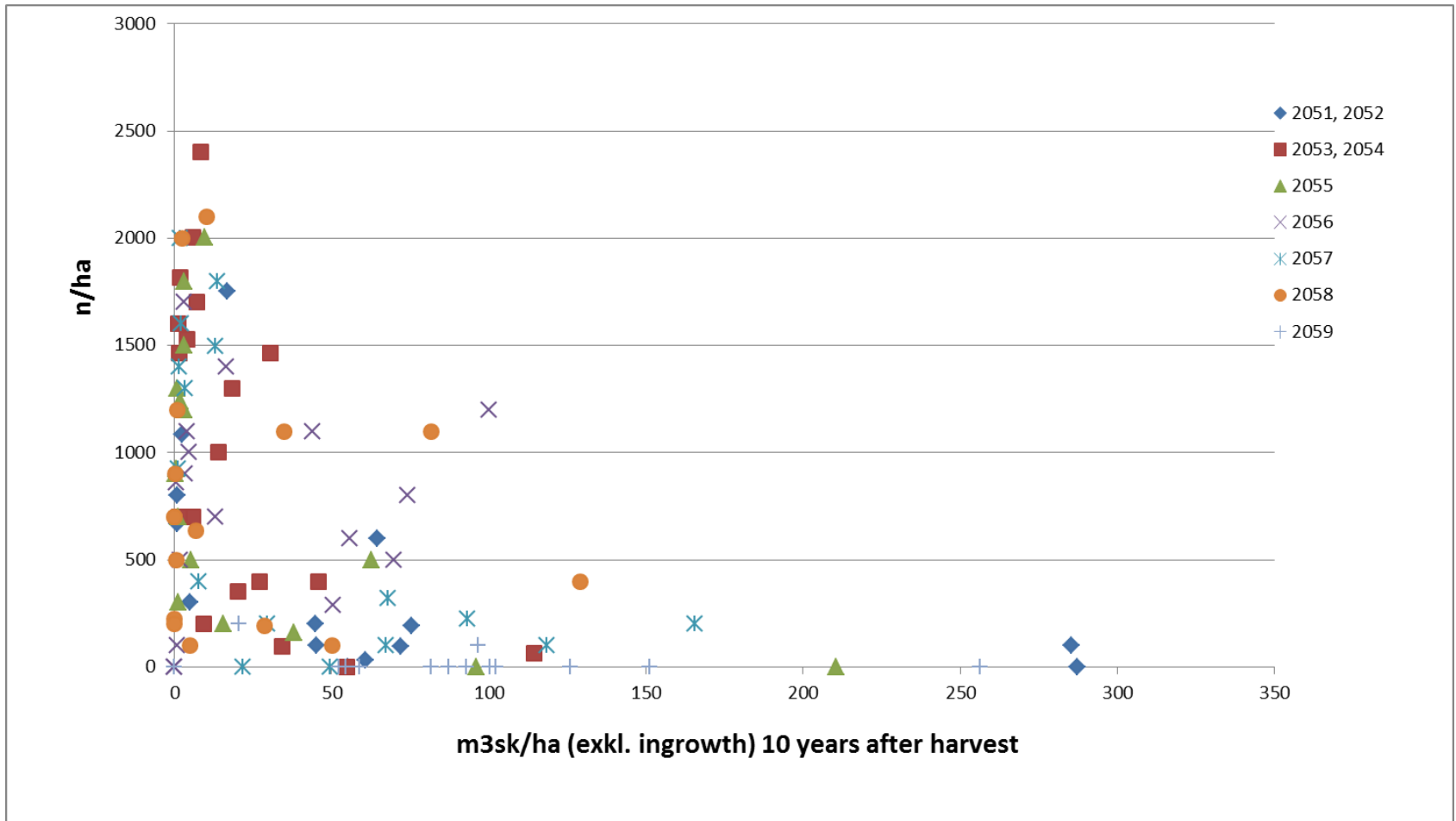
### -Piellovare 2059



# Survival of planted seedlings after 22 years

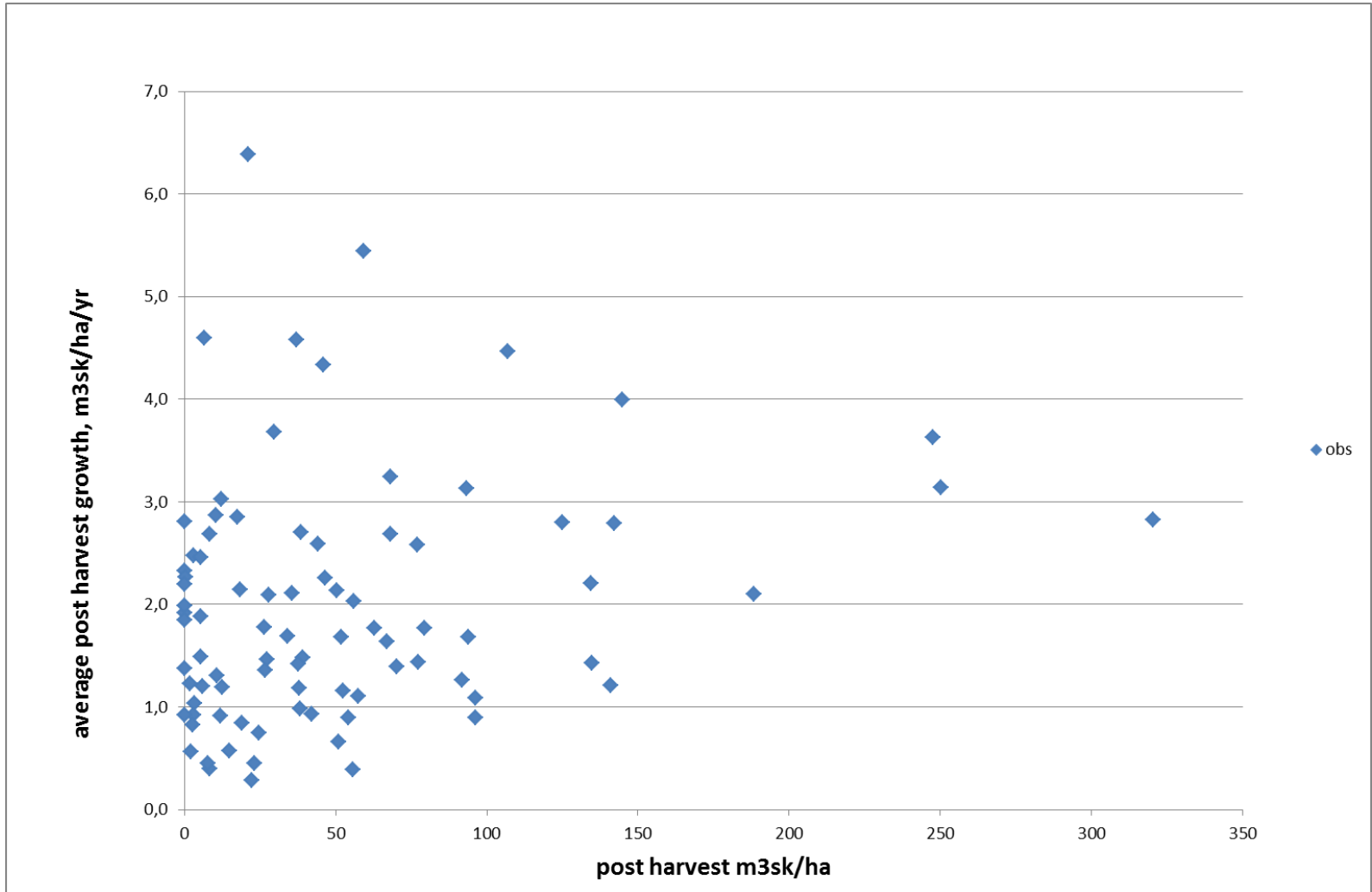


# Ingrowth





# Growth=f(volume after harvest)



# Hagner experiments conclusions

- Treatments and results highly variable
- CC generally higher growth
- Plots should be treated as sample unit irrespective of treatment
- Avoid wind exposure
- Site conditions important
- Planting interesting
- Economy?