GENERAL INFORMATION

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MATERIALS & METHODS

study area	2g
time period	August 1981 – February 1982, March – November 1982
goal	gain insight into the development of a young stand - how is a even-aged, homogenous 12-year old of grey alder structured? - is the stand differentiated at this age? - are dominant trees present? - did the stand structure result in a certain crown form/structure? - how is the phenology, how much biomass is produced?
set-up	full inventory (3118 m², 323 trees) - central zone (1965 m², 216 trees) - border (1153 m², 107 trees) social position, crown development, phenology (central zone) - 10 tree cells = dominant tree + 6 nearest neighbours - 10 tree pairs = tallest and smallest tree in a tree cell litter trap - traps with surface area 0.12 m² in 10 cells
data collection	full inventory - all ash: diameter (NS & EW), height, branch-free stem length, crown radius NESW, max horizontal reach NESW phenology + litter fall - March-June: weekly evaluation of the leaf development - March-November: forthnightly leaves gathered, dried (105°C), and dry mass determined
remarks	- Planted spring 1972, on pasture, without prior soil preparation. 2-Year old plants (Z_1V_1), 80-120 cm tall. Planted in equilateral triangular bracing with sides of 3 m, 1100 plants/ha. In 1982: 1035/ha extra. - Map with crown projections. - Schemes per tree cell with trees and crown dimensions.

RESULTS

Inventory

	stand	central zone	border
mean height in m (sd)	9.68 (1.67)	10.35 (1.08)	8.36 (3.01)
mean height growth in cm/y	80	86	69
mean diameter in cm (sd)	10.5 (2.31)	11.4 (1.86)	8.8 (2.37)
mean diameter growth in cm/y		0.94	
basal area (m^2/ha)	9.44	11.4	6.04
mean basal area growth m^2/y	0.78	0.95	0.50
mean basal area/tree (cm^2)	91.2	104.4	65.2

- Central trees are 20 % taller and 23 % more bulky (basal area 38 % larger) than border trees. Western border ashes (row 1 & 2) grew least (hindered by the pollard willows and western winds), middel row (row 6) tallest ash, eastern border (row 11) less hindered.
- Good youth growth
- Central zone: normal distribution for the height and diameter classes, small right assymetry
- The dominated trees in each tree cell are significantly smaller (h & diam).
- 5 birches, planted between the ash: similar dimensions
- 12 oaks in the stand (natural regeneration): diam&h < ash

Structure

	stand	central zone	border
height (m)	11.8	12.06	11.17
cover ashes	1.11	1.29 28.5 % double 2.07 % triple	0.79
mean crown projection (m^2)	10.75	11.82	8.58

- little vertical structure, only in the central zone some form of dominant and subdominant layer with a significant difference in height between the trees of a tree pair (method Van Miegroet & Lust)
- mean crown projection central zone 28 % larger than in the border, no difference between dominant/subdominant layer or dominant/dominated trees
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Crown development

(sd)	mean tree	centrum	border	dominant	dominated
branch-free stem length (m)	2.17 (0.96)	2.07 (0.97)	1.53 (0.57)	2.44 (0.98)	1.67 (0.92)
crown width (m)	3.95 (0.45)	3.93 (0.44)	3.35 (0.62)	3.95 (0.38)	3.49 (0.6)
crown lenght (m)	8.53 (1.09)	8.28 (1.33)	6.91 (1.59)	9.38 (0.63)	8.01 (1.06)
crown volume (m^3)	35.9 (9.37)	34.96 (10.05)	22.82 (11.29)	37.14 (7.67)	26.7 (11.32)
crown surface (m^2)	238.63 (48.26)	230.29 (52.96)	170.48 (68.10)	246.19 (42.24)	226.45 (49.66)

- mean tree
    - no difference between light/shade crown (only in northern direction: crown lenght and crown volume larger for the light crown)
    - northern part better developed than southern part (crown width & radius)
    - east correlated with north, west with south
- border vs central zone
    - border trees differ from central trees
    - light/shade crown different in the border (volume & crown surface larger for light crown)

    - light/shade crown differ for all cardinal directions for the border trees (east best, west least developed), only north different in the central zone
- dominant vs dominated
    - dominant crown better developed
    - no differences in light/shade crown for the two trees (yet, light crown longer than shade crown for dominant trees)
    - dominant trees: light crown better developed at the northern side
    - crown dominated tree is well-proportioned

Form

	centrum	border	upper layer	subdominant layer
slenderness (h/d)	92 (12.25)	97.79 (14.109)	90.41 (12.38)	94.43 (12.06)
crown index (KL/D)	2.12 (0.31)	2.03 (0.47)	2.14 (0.32)	2.03 (0.28)
D/d	35 (4.43)	40.05 (8.9)	34.33 (4.24)	36.68 (4.48)

- border trees more slender, with a broader crown
- trees upper layer less slender, narrower crown
- no significant difference between dominated and dominant tree
- no significant allometric relationships for dominant trees, significant relationships for mean and dominated trees

Phenology and biomass

- end March: first bud burst, 9 April: all trees have burst buds, beginning of June: all leaves full-grown
- no significant differences between dominated/dominant trees
- total leaf biomass: 3641 kg dry matter/ha
- leaf litter fall starts two weeks after bud burst, strong increase from July onwards, less in August & September, most leaves have fallen down by the end of October.

CONCLUSIONS

- morphology differs between border and central zone, little variation in the central zone
- strong and regular youth growth in the central zone (soil conditions ok, low impact of external factors), little growth in the border (no full light, high impact of external factors)
- no differences between light/shade crown in the central zone, differences in the border zone, crowns in the central zone better developed than in the border
- little structure, no lower layer, crown dominant trees better developed
- dominant trees relatively stable, relatively low slenderness
- dominated tree slender: diameter growth more reduced than height growth

sylvicultural interpretation

- dominant position taken early
- the development of a stand is characterized by social degradation: subdominant individuals will stay subdominant
- dominating trees will become more dominant (better growing conditions)
- management of young stands should look at the individual trees when the crown development of the dominant trees is hindered by neighbouring trees