THE INFLUENCE OF INITIAL TREMBLING ASPEN STOCKING ON SUBSEQUENT STAND DEVELOPMENT

Project MS-249

by

G.A. Steneker

Forest Research Laboratory

Winnipeg, Manitoba

Internal Report MS-61

Department of Forestry and Rural Development

June 1967

TABLE OF CONTENTS

The Influence of Initial Trembling Aspen Stocking on Subsequent Stand Development

Project MS-249

by

G.A. Steneker

INTRODUCTION

Recently, with the construction in the Prairies of several wood industries utilizing trembling aspen (Populus tremuloides Michx.), the demand for the species, especially good quality material, has increased. To sustain such industries for years to come, it is necessary to have a good supply of utilizable material and at the same time the assurance that on cut-over aspen areas regeneration is adequate.

From thinning studies conducted in the Region so far, information is available on the development and increment of aspen stands 15 years of age and up at various density levels (Steneker and Jarvis, 1966). Little is known however, about aspen sucker development (the common mode of aspen regeneration) from the time of their appearance until they are about 15 years old. Stoeckeler and Macon (1956) listed percentage of minimum required stocking by milacre quadrats for satisfactory stand development for ages between 2 and 9 years. Graham (1963) suggested that 12,000 well-distributed suckers per acre is a desirable stocking and that the number should certainly not be less than 6,000. Strothmann and Heinselman (1957) compared the growth of one-year-old suckers, which ranged in density from 500 to 10,000 per acre. They found no influence on height increment. More weak suckers were found under dense than under light stocking conditions, which was probably a result of natural competition. They noted that the controls (with 10,000+ suckers) had a greater number of tall stems (10+ feet) after 5 years than the thinned plots.

Decay studies by Basham (1958) and Thomas, Etheridge and Paul (1960) indicated, that most trunk rots in aspen can be traced back to dead and broken branch stubs. Dense stocking will probably hasten self-pruning, thereby minimizing the chances for infection through dead branch stubs. Horton and Maini (1964) also mention, that where high quality aspen is desired, prolific suckering is required.

The purpose of this investigation is to study on an aspen cut-over area the influence of density of 1 to 2-year-old suckers upon their subsequent stem and crown form and height and diameter growth in later years.

LOCATION AND DESCRIPTION OF EXPERIMENTAL AREA

In co-operation with the aspenite division of MacMillan, Bloedel and Powell River (Sask.) Ltd. an aspen cut-over area was selected in 1966 along the Bertwell Road about 25 miles south of Hudson Bay Junction. (Map reference: TP41, R4, W2). The previous stand, almost pure aspen, was cut in 1964 and only a few non-commercial trees were left. The soil profile indicates a moderately moist to moist clay loam till.

A tally in 1966 of the aspen regrowth showed an average sucker height of about 4 feet and a sucker density per acre up to 30,000. No attempt was made to compute the percentage area occupied by various sucker densities.

METHODS

A total of 24 permanent sample plots, ranging in size from 8 x 8 feet to 50 x 50 feet, were established on the cut-over area. The suckers within the plots (and their surrounds) were thinned to specific densities as follows:

No. of plots	Plot size	No. of suckers/plot after thinning	Approx. no. of suckers/acre after thinning
3	8 x 8 feet	29	20,000
3	9 x 9 feet	28	15,000
3	10 x 10 feet	23	10,000
3	15 x 15 feet	31	6,000
3	20 x 20 feet	28	3,000
3	35 x 35 feet	28	1,000
3	40 x 40 feet	26	700
3	50 x 50 feet	29	500

A map showing plot location is given in Appendix I. All non-commercial aspen which had been left standing and which were within 50 feet of any plot boundary were girdled. Within each plot the location of all residual suckers after thinning was mapped and all suckers were tagged. The height of each sucker was recorded (Table 1) and a note was made of stem form, relative height and quality of each sucker, using the following classification code.

Height: Dominant (100), Intermediate (200), Suppressed (300).
Stem Form: Straight (10), Moderately straight (20), Crooked (30).
Quality: No visible defects (1), Some defects (2), Severe defects (3).

Suckers given a (2) for quality, showed signs of frost damage and leader dieback. Suckers given a (3) for quality showed in addition lesions on the stem. Using this code to classify the suckers on each plot after thinning the following break down presented in Table 2 was obtained.

TABLE 1

AVERAGE HEIGHT (FEET) OF SUCKERS BY TREATMENT IN 1966
AND THE RANGE IN HEIGHT BY PLOTS

Plot size	No. of plots	Av. ht. (feet)	Range
8 x 8	3	3.7	1.8 - 5.5
9 x 9	3	3.6	1.5 - 6.7
10 x 10	3	4.5	2.2 - 7.1
15 x 15	3	4.3	2.2 - 7.2
20 x 20	3	4.2	1.2 - 6.3
35 x 35	3	4.6	1.5 - 7.3
40 x 40	3	4.7	2.0 - 6.5
50 x 50	3	4.6	2.0 - 6.9

TABLE 2

CLASSIFICATION OF STEMS IN 1966 BY HEIGHT

FORM AND QUALITY

Class	No. of stems	Code
Dominant	524	100
Co-dominant	95	200
Suppressed	75	300
Straight	450	10
Mod. straight	192	20
Crooked	22	30
No visible defects	250	1
Some defects	318	2
Severe defects	96	3

If only those suckers with no (3) in their classification code are considered to have future growth potential then the percentage of suckers considered "acceptable", ranged in 1966 by plots from 66 to 86 per cent.

A permanent stand profile, 2 feet wide and 50 feet long, was established. The position of all aspen suckers and their height was recorded and mapped, (Appendix II). The purpose of this profile is to follow up the height development of the suckers relative to one another particularly in relation to clumps and openings.

FUTURE WORK PLANNED

Periodic remeasurements every 2 years on the permanent sample plots and the stand profile will be carried out to follow height and diameter growth and the development of sucker form under various densities. A tally of mortality will be kept to show its relation to density. Rate of self-pruning will be examined at times of remeasurement. At remeasurement those suckers, which have appeared since establishment will be removed in order to maintain the specific density levels. Vegetation other than aspen will be left.

It is hoped, that by repeated measurements and observations of the trees on the plots an estimate will be obtained of the number of suckers initially required to produce a specific number of acceptable trees later on.

If time permits an additional cut-over aspen stand will be selected in 1968 and a further 24 sample plots will be established and treated in the manner described here.

REFERENCES

1. Basham, J.T. 1958. Decay of trembling aspen. Can. J. Bot. 36:491-505.

2. Graham, S.A., R.P. Harrison Jr. and C.E. Westell Jr. Aspens — Phoenix trees of the Great Lakes Region, Ann Arbor Univ. of Mich. Press 1963 xiii 272 pp.

3. Horton, K.W. and J.S. Maini. 1964. Aspen Reproduction; its characteristics and control monograph. Canada Dept. of Forestry, For. Res. Br. 64-O-12.

4. Steneker, G.A. and J.M. Jarvis. 1966. Thinning in trembling aspen stands, Manitoba and Saskatchewan. Dept. of Forestry Publication #1140.

5. Stoeckeler, J.H. and J.W. Macon. 1956. Regeneration of aspen cut-over areas in Northern Wisconsin J. For. 54:13-16.

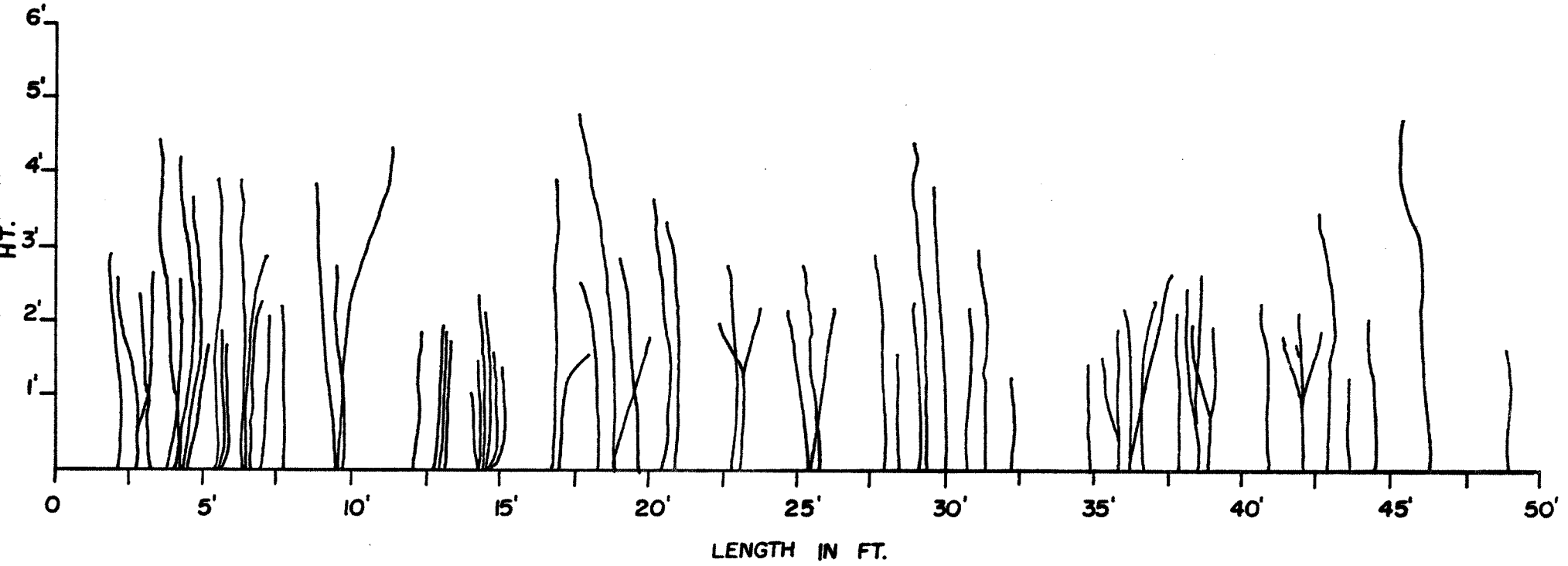
6. Strothmann, R.O. and M.L. Heinselman. 1957. Five-year results in an aspen sucker density study. U.S.D.A. For. Serv. L.S.F.E.S. Tech. Note #490 2 pp.

7. Thomas, C.P., D.E. Etheridge and G. Paul. 1960. Fungi and decay in aspen and balsam poplar in the Boreal Forest Region, Alberta. Can. J. Bot. 38:459-466.

APPENDIX II

PROFILES OF ASPEN SUCKERS, BERTWELL ROAD AREA, HUDSON BAY, SASKATCHEWAN

HORIZONTAL VIEW *



*Note that most suckers consist of a primary shoot and that side branches at this age have not yet developed to any extend.

VERTICAL VIEW