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A COMPACT PRECIPITATION RECORD

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In forestry research it is often necessary to collect and interpret rainfall data. The authors describe a convenient method of recording precipitation data that should have wide application in forestry research.

IN THE Forstamt Langenbrand, Schwarzwald, Germany, there is used what seems to be a most efficient method of recording precipitation. Daily observations are taken, and monthly and yearly totals are obtained. Ordinary squared paper is used as shown in Figure 1. Each monthly and yearly total is entered in centimeters in the proper square, which is then washed with ordinary water-colors. The usual legend employed red for dry, green for average, and blue for wet months. In Figure 1, because of the cost of reproducing colored charts, various systems of cross-hatching have been substituted.

After considerable searching, we located a surprisingly complete precipitation record in the files of our local County Planning Board. This record begins with January 1828, and gives practically a complete array of monthly and yearly totals except for the Civil War period (1861-1865).

To set up the dry, average, and wet classifications by months and years, monthly and yearly frequency curves were plotted and the arithmetical mean, standard deviation, and standard error computed. For the monthly classifications, values within the "mean" class interval were listed as "average," those below this interval as "dry," and those above as "wet." The yearly frequency curve, based on 95 observations, warranted making five classifications—very dry, dry, average, wet, and very wet. The arithmetical mean fell very close to the center of the "average" interval. The two adjoining class intervals on the "wet" side of this average were designated as "wet"; everything above that as "very wet." The two adjoining class intervals on the "dry" side were designated "dry," and anything below them as "very dry" (Fig. 2). Appropriate colors were allotted to these "very wet" and "very dry" annual classes for use in the chart shown in Figure 1.

While it is somewhat on the academic side, it seemed wise to make a statistical analysis of the data to check the validity of these classifications. The results of this analysis are shown in Table 1.

In Table 2 the percentage of the total number of observations of each of the various rainfall classes and the percentage of the total area under the curve in Figure 2 of each of these classes is given. The distribution is approximately normal.

The mean for each month for the period was plotted. This revealed that July and August are the months of most precipitation. In this region, thunder storms are most frequent during July and August, which is probably the reason for their high monthly averages.

The practical significance of a complete rec-

TABLE 1.—SUMMARY OF STATISTICAL ANALYSIS OF THE PRECIPITATION DATA

Month	No. of observations	Arithmetic average monthly rainfall	Std. deviation	Std. error
		Inches		
January	106	3.40	1.585	.154
February	104	3.14	1.542	.151
March	105	3.44	1.969	.192
April	105	3.44	1.751	.170
May	106	3.85	1.933	.187
June	104	3.66	1.821	.178
July	104	4.23	2.162	.212
August	105	4.16	2.641	.258
September	104	3.71	2.507	.245
October	102	3.66	2.341	.230
November	103	3.51	1.748	.172
December	105	3.24	1.557	.151
Yearly	95	43.21	7.915	.811

TABLE 2.—PERCENTAGE OF TOTAL NUMBER OF OBSERVATIONS IN EACH OF THE RAINFALL CLASSES AND THE PERCENTAGE OF THE TOTAL AREA UNDER THE CURVE IN EACH OF THESE CLASSES (from Fig. 2).

Class	Percentage of total observations	Percentage of total area under curve
Very dry	1.1	2.5
Dry	18.0	20.25
Average	56.2	50.30
Wet	21.3	23.60
Very wet	3.4	3.35
	100.00	100.00

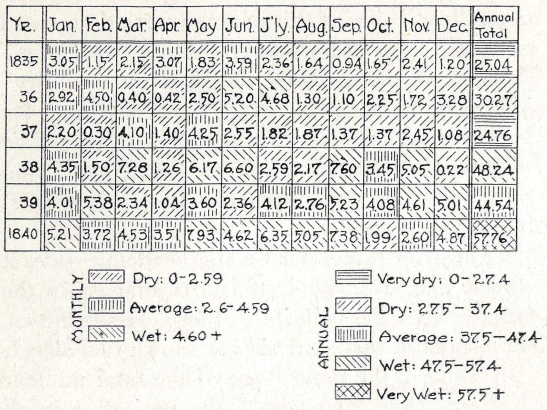

Fig. 1.—Graphic summary of total monthly and annual precipitation.

ord of precipitation covering a long period of time is apparent in any study of increment. Such a record offers a good check in the cross-referencing of ring width variation. Since survival of planted stock is dependent among other factors on rainfall, data which give a complete average long-range monthly picture of rainfall should aid in selecting the best time to plant. These data should also help in choosing what species to plant.

This record will be of immediate practical use on the Black Rock Forest in furthering a current study of the gradual demise of chestnut oak, and in increment studies on certain species since 1830.

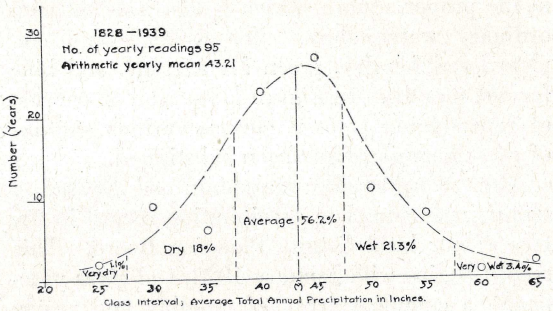

Fig. 2.—Yearly frequency curve of rainfall showing the five rainfall class intervals.