as a certain depth applied in one month, or a certain percentage of the full season's duty in one month.

As already pointed out, the total quantity required for the season does not determine the required rate of delivery, for it does not take into consideration the fluctuating character of the water requirements. The demands through the season are never, under any circumstances, uniform. To state the quantity required per month, rather than per season, is better, but even the arbitrary division into months may not always meet the conditions imposed. The base should be that period, of whatever length, within which important crops under the system must receive an irrigation, or, this being delayed, will suffer in consequences. The length of the period will be influenced by the climatic conditions and the nature of the crops. In Egypt, for instance, the principal crop is cotton, and it has been determined that it requires an irrigation once in eighteen days. The base in that case should be eighteen days and the capacity of the system determined on that requirement.

The question arises, will this principle apply to conditions in Southern Alberta? The climatic conditions of a short season, but long days of bright sunshine, produce a short, intense growing season which necessitates the crop being urged through the growing stage without opportunity for a set-back, otherwise either the yield will be materially reduced or the date of maturity will be too far prolonged, or both. Hence the maximum demands are concentrated within a very short period.

Not to be provided with a reasonable irrigation within that period will mean practical failure, or at least dry-land returns to most crops. It may be called the critical period, and its length should be the "base" used in computing the required rate of delivery. Probably a fair statement of its length as applied to average conditions in Southern Alberta is fifteen days.

A chart appearing elsewhere in this report entitled "Diagram showing the effect of rainfall and irrigation on crop yield" under the report of the Duty of Water investigations presents a very striking illustration of the above argument. It will be noted that the McArthur wheat, irrigated at the proper time, produced 31 bushels per acre, the McArthur and Stewart wheat irrigated nine days later fell off 15 per cent. in yield, and the Suggitt wheat irrigated sixteen days later fell off 37 per cent. It is also worthy of note that a delay in applying the irrigation likewise delayed the date of maturity of the crop.

In arriving at the conclusion that fifteen days, or thereabouts, is the length of the critical period and is to be used as the base in our computation, it does not necessarily follow that all the land under the system must be provided with an irrigation within that time. Two important factors need to be considered in that connection: first, what is termed the "irrigation factor," or the percentage of the entire irrigable area which is likely to be irrigated during any one season; and second, the percentage of the area which is in crops whose water requirements are of an exacting, non-drought-resisting nature. It is essential that crops of this class, in which may be included grains, garden produce, sugar beets, etc., be provided with water promptly when needed. On the other hand, such crops as alfalfa, while requiring a greater total amount of water during the season, are less exacting in their demands, and can suffer a delay with less permanent injury. It will then serve his own interest, no less than the efficiency of the system as a whole, for the irrigator to plan to water his forage crops as much as possible before and after the critical period during which all the water supply, and perhaps more, is required to save the more perishable crops. It is evident that the greater the proportional area in one crop of an exacting nature, the greater the allowance necessary for increased capacity during periods of pressure.

Ordinarily the irrigation factor will not exceed 80 per cent. For illustration let it be assumed that 75 per cent. is a fair figure. Then, with 25 per cent. of the land idle, and, say, 25 per cent. in crops whose requirements are of the less urgent nature, 50 per cent. must be watered during the critical period.

The depth which will be required for one irrigation will, under ordinary practice, vary from 0.3 feet to 0.8 feet, and will average 0.5 feet.

On the above assumed basis, the system should be designed to deliver 0.5 feet depth to 50 per cent. of the irrigable area in a period of fifteen days. This is equivalent to 0.25 acre-feet per acre in fifteen days, or 0.0167 acre-feet per acre per day, equal to 0.0083 second-feet per acre, or a net capacity of one second-foot for each 120 acres. Frequently only one irrigation will be applied in this climate on certain crops; but just as great a capacity, if not greater, is required to deliver that one irrigation at the proper time as for three or four irrigations, extended over the entire season, because the major part of the land will want it at one and the same time.

The above serves to emphasize the importance of a proper diversification of crops, in order that the water requirements may be more evenly distributed. It also emphasizes the importance of reservoirs for storing water during periods of low demands for use during periods of pressure.

The old system of constant flow delivery has given place almost universally to the more practical rotation system. But in adopting the rotation method of delivery instead of the constant flow, the extreme should be avoided. That is, the rotation period must not be made too long. This point has been brought out in discussing the capacity to be provided for in designing the system. It may be presented from a partially different point of view. What is meant by going to the extreme in rotation is giving each farmer enough water to thoroughly irrigate his entire irrigable area in one short run. It is better to divide it into two or three runs, so that he will always have at least a small quantity at his disposal within a short period rather than the whole quantity at once, and being compelled to wait correspondingly longer between runs. In other words, he can come nearer meeting the agricultural requirements with a flow two days out of each ten, or three out of each fifteen, than if he has one run of six days in each thirty. It is in every way fairer to the water user, for if he receives a run only once in thirty days, and must take it in his turn, it may come either before or after the time he most needs it. On the other hand, his neighbor's turn comes just at the period of greatest need and produces much greater benefit. Such an arrangement works an injustice.

It is much easier to plan a system of distribution where the rainfall is negligible. Rainfall introduces complications. Where the irrigator is of an optimistic disposition, and likewise strongly disposed to avoid unnecessary labor, he is likely to postpone his irrigation to the last possible moment, on the prospect of a providential rain making it unnecessary. The hoped-for rain does not come, the farmer is thrown behind in his work, the water