



A study of the chemical composition of certain vegetables grown under different conditions of soil moisture  
by Jack E Myers

A THESIS Submitted to the Graduate Committee in partial fulfillment of the requirements for the Degree of Master of Science in Chemistry at Montana State College  
Montana State University  
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Abstract:

This Investigation has been an Intensely practical one. No attempt has been made to study the principles or mechanisms Involved In the Intake of mineral nutrients by plants. Only actual field conditions have been studied.

1. Several techniques of irrigation have been studied in regard to their effects upon the calcium, iron, nitrogen, phosphorous, ash, and water content of the edible portion of a number of common vegetables. The period of irrigation, the amount of water applied, and the method of application have been shown to be three influencing factors.
2. Three different periods for single irrigations by the flooding method were found to influence the chemical composition of the seeds of peas. High nitrogen content was definitely favored by early irritation. Calcium, iron, and phosphorous contents were high for different periods. Water content was not appreciably influenced by the period of irrigation.
3. Three different amounts of water applied by the flooding method were found to influence the chemical composition of the seeds of peas. In general the total content of ash constituents was depressed by increasing amounts of water. Water content of seeds was not appreciably influenced by the amount of water applied.
4. The response of chemical composition to varying amounts and periods of irrigation was less marked than the response of the total production of edible portion.
5. Three different methods of irrigation and a lack of irrigation were found to have different effects upon the composition of the edible portions of twelve common garden vegetables. Lack of irrigation produced vegetables generally low in moisture, high in nitrogen, and high in total ash. No correlation was found for the response of different vegetables to the three methods of irrigation.
6. On the basis of this study and previous statistical studies of the composition of plants, it has been pointed out that mineral composition of vegetables varies a great deal more than is commonly supposed.
7. It has been suggested from the results of this study that irrigation offers a means of controlling the mineral and nitrogenous composition of vegetable crops.

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CONDITIONS OF SOIL MOISTURE

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June, 1935

N 378

M 995

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I. INTRODUCTION

During the past few years the practice of irrigation has undergone unusually rapid development. Agriculture is seeking dependability, greater possible diversification, and the use of more efficient climatic conditions. Irrigation is a possible answer to each of these. It is therefore not surprising that the practice of irrigation, once proved practicable, should have developed so much more rapidly than its investigation by scientific methods.

One of the problems inherent to the practice of irrigation is how to apply water most efficiently. In this problem at least three important factors are involved: the method of application, the time of application, and the amount of water applied.

In 1933 the Horticulture Department of the Montana Agricultural Experiment Station, having observed several different methods of irrigation in use throughout the state, became interested in the relative merits of these methods. One of the questions raised was whether the various methods have any different effects on the nutritive value of the vegetables raised. This was taken to the Department of Home Economics, but in a search for literature on the subject no conclusive data were found. The Horticulture Department and the Home Economics













































































































































