A Geographical Analysis of the Emergence and Subsequent Disappearance of the Cotton Industry in the Virgin River Basin (1856-1910)

Brooks Kent Hanson

Brigham Young University - Provo

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A GEOGRAPHICAL ANALYSIS OF THE EMERGENCE AND
SUBSEQUENT DISAPPEARANCE OF THE COTTON INDUSTRY IN THE
VIRGIN RIVER BASIN (1856-1910)

A Thesis
Presented to the
Department of Geography
Brigham Young University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
Brooks Kent Hanson
August, 1967
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The author also wishes to give recognition to the valuable contributions on the history of the Virgin River Basin made by Andrew Larson and Ivan Barrett who have prepared theses on that subject as some of their material proved very valuable to this study. Gratitude is also extended to all those who have willingly given information concerning the many phases of the cotton industry in Utah.
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INTRODUCTION

To the early Mormon pioneers self-sufficiency was important. Accordingly, they wanted to have a domestic source of raw materials for their clothing needs. For this reason, the cotton mission in the Virgin River Basin was begun and hundreds of families sent south on missions to produce this staple. Between the years 1856 and 1910 much cotton was raised and processed within the Territory of Utah, Nevada and Arizona, providing the inhabitants of Zion with the textiles they needed. Much was sent outside the territory and brought in hard cash and vital commodities in return to the early pioneers. But the problems connected with raising cotton in Utah were many and caused frequent crop failures and low yields. Food crops along with cotton suffered and serious shortages in food stuffs ensued. Such trials tested even the stoutest hearts and many of the less faithful were drawn away by more profitable ventures elsewhere. But more cotton missionaries were sent to fill their ranks in an attempt to swell the production of cotton for the territorial market. A chain of cotton producing settlements strung from what is now the southern entrance of Zion National Park south along the Virgin River almost to its junction with the Colorado River. This was more than just a chain of settlements—
it was part of the Mormon Corridor stretching from Salt Lake City, south through Utah's Dixie and southwest across Nevada and California to the Pacific. Settlements such as Las Vegas and San Bernardino had been founded by the Mormons to aid new Saints emigrating to Utah from the four corners of the world.

The Problem

Cotton was produced in large quantity in southern Utah between the years of 1856 and 1910. Farmers there gained valuable experience in cotton culture and became quite proficient at producing it. The level of skill improved among cotton factory workers and the quality of their textiles increased. Transportation within the territory became progressively better and cheaper. Market potentials were growing and farming technology improving. Yet in the midst of all this, the amount of cotton produced steadily declined in Utah, despite the fact that no desire to abandon the cotton industry had been expressed by Latter-day Saint Church leaders. This, also at a time when cotton raising was becoming a flourishing industry in other Western states.

What were the causes for the disappearance of cotton in the Virgin River Basin? Were they caused by problems associated with the physical geography of the Virgin River Basin, such as climate, soils, water supply or physiography? Were the reasons economic, involving marketing? Or was the problem simply a lack of technology? The purpose of this thesis is
to answer these questions and establish relationships between them.

Method and Procedure

The approach to the problem will be from a geographic standpoint. Much of the material will be historical, therefore, the methodology employed will be that used in historical geography. In addition, other methodologies of geography will be used. These will include physical geography where a study of physiography, vegetation and soils will be undertaken; systematic geography with studies on climate; and regional geography where different locations in the Virgin River Basin will be examined. Though a few works have been written involving the history of the Virgin River communities and cotton culture, no work has been done on the geography of the cotton industry in Utah.

The people most intimately connected with cotton culture in Utah are not with us, and their experiences must be wrung from the records they kept. In an attempt to arrive at some answers to the above questions, many works have been carefully analyzed. These include histories, both primary and secondary, of the areas where cotton was grown, diaries of those who participated in cotton's heyday in Utah, and journals kept by church leaders. These include Bishops and Stake Presidents who are leaders over various ecclesiastical divisions or local congregations. A Bishop presides over the latter, while a Stake President has authority over a given number
of Wards under his jurisdiction. In addition, interviews with experts in soil science and agriculture have been held, records of canal companies studied, and government surveys and census reports searched. The old factory at Washington and many of the sites where cotton was once grown have been visited, and field work has been done in these areas.
CHAPTER I

HISTORICAL BACKGROUND OF THE COTTON INDUSTRY IN UTAH

Satisfying human needs is the most fundamental pursuit of any society. The demands of food, clothing and shelter must be met or human existence will perish. Such problems had to be faced squarely by Latter-day Saint leaders if their people were long to survive in the desolate Great Basin country they were settling.

Could this bleak, barren waste land sustain a large body of people? The men who knew the country said no. But the Mormons were far from any major market centers, and unless they provided for their wants they would not last in the desert. Wheat and other grains could be raised in the desert if water could be turned onto the hard ground, and with their cattle dairy products such as milk, cheese and butter, could be produced. But sufficient and adequate raw materials for clothing posed a problem.

Markets in California could provide needed clothing at reduced rates in return for Great Basin-grown foodstuffs, but Church leaders did not want to be dependent on outsiders for vital commodities. They said, instead, that they must build a self-sustaining commonwealth, and that clothing should
be the creation of their own hands.

Canvas wagon covers and animal skins are hardly satisfactory to a progressive people in need of clothing. Mormon leaders knew that cotton was one of the most desirable materials for making clothing and hoped that it could be successfully raised within the territory. But they wondered if it would tolerate the alkali soils found in the valleys of the Great Basin. Could a warm climate be found with a long growing season and proper soils necessary for cotton culture? If cotton could be raised within Utah, could home-manufactured textiles compete successfully with imported goods? Such were the questions that the early pioneers were confronted with.

The Great Basin was explored by vanguards who were sent to discover its potential. They traveled south of the Basin's rim hoping to find a mild climate and discovered that the elevation decreased. In the far south in the Virgin River country, these scouts did find climate and soils that seemed favorable to cotton. Soon after this report reached President Brigham Young, who was Governor of the Territory of Utah and Prophet of the Latter-day Saint Church, experienced cotton growers from the Southern states were sent to this southerly location to experiment with the growing of this staple. After a few seasons it was learned that cotton could grow successfully there. This brought the hope of a self-sustaining society closer to reality.
The Home Industry Policy

The attitude toward being independent was an early policy of the Latter-day Saint Church. This belief had come in a revelation to the church wherein the Saints were instructed to "let all thy garments be plain and their beauty the beauty of thine own hands". The policy of dealing only among themselves, having little or no commercial intercourse with outsiders, had also been adopted. It had been outsiders who thrice had driven the Mormons from their homes, first in Ohio, then in Missouri and Illinois. Brigham Young, like Joseph Smith, their first leader, desired the Saints to be independent and develop every available resource for their benefit. Such a policy would also help keep what little cash there was, within the Territory. A self-contained economy was not only a good policy for them, but meant life or death to the people.

A self-sufficient commonwealth was eventually achieved through dire necessity. Being isolated in the fastness of the arid Basin sparked the initiative which made them independent. Transportation was a major problem since they were separated from world markets by hundreds of miles and by two of the nations highest mountain ranges. These humble agricultural peo-

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1 Doctrines and Covenants (Salt Lake City: Church of Jesus Christ of Latter-day Saints), Sec. 42, vs. 40.

2 Milton R. Hunter, Brigham Young the Colonizer (Salt Lake City: Deseret News Press, 1944), p. 158.
ple could not afford the costly freighting charges tacked onto all the imported goods. According to the Deseret News of May 8, 1861, shipping costs ran around $250 per ton into the Salt Lake Valley from Independence, Missouri.

The Saints were fortunate in having a great variety of manufacturing skills. Over 300 trades and occupations were represented in the Territory. This helped make possible the realization of a self-reliant empire.

Brigham Young prayed that the bars of isolation should be raised high so that the Saints would be forced to turn with diligence to manufacturing. The country offered many opportunities for the development of economic independence. The soil was fertile, and with the aid of irrigation became very productive. The climate was variable from place to place so that not only temperate fruits and grains would grow, but even semi-tropical products, as figs. Cotton could flourish.

From almost the moment the pioneers set foot on the valley floor of Salt Lake, they were instructed by their leaders to devote themselves toward economic independence. It was their duty to raise every necessary article for food and clothing. Before importation of machinery and other implements, manufacturing of needed articles and clothing was carried on within the homes. Women did almost all of this manufacturing. They washed and carded the wool, spun the yarn and made the wearing apparel for the entire family.

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After cotton was raised in Dixie, and before gins, spinners and weavers were imported, females prepared the cotton, and made it into clothing. If some were tempted to purchase Gentile-made goods instead of making their own clothing, they were considered to have committed an evil fit for repentance, for economic self-sufficiency was serious business.

Skillful as manufacturing in the home proved to be it could not possibly supply the great demand for necessary articles, so as soon as machinery could be imported it was put into operation. This increased manufacturing and encouraged the growing of raw materials.

Before machinery created a sufficient demand, little attention was paid to keeping flocks in good shape and free from disease because there was no market for wool, and cotton growers in Dixie had gone to raising molasses and wheat instead of cotton. With importations of machinery and setting up of factories, demand for cotton and raw wool of good quality increased. Matthew Gaunt set up the first woolen mill in the Basin and a cotton factory was established at Parowan. This gave cotton growers farther south a place where their lint could be made into cloth.

In response to these conditions, cotton had been raised on a small scale in Dixie before the Civil War. Cotton was an infant industry when the curtailing of this staple from the South sky-rocketed cotton prices and placed king cotton upon a rightly deserved throne. Thus cotton became a most
vital part in the home industry program of the Church. President Young urged large scale cotton growing, for unless the Saints produced this staple, they would go naked as a consequence of the War. 5

Exploration Parties Sent Out

Almost immediately after the vanguard had arrived in Salt Lake Valley, exploring parties were sent out to determine the resources of the area. Pioneers pushed out lines of exploration which rapidly multiplied information relative to the Territory. The first Mormon to view the south western region along the Virgin was Captain John Jefferson Hunt of Mormon Battalion fame, who, with a small party, pushed to the Pacific coast for provisions in the fall of 1847. Governor Young was excited about prospects here for cotton culture. That fall he sent fifty men south to the Virgin country under the leadership of Parley P. Pratt to investigate its possibilities. 6 John D. Lee led a company of men to southern Utah in 1851. They stopped at Parowan for the winter. During the winter some of the men explored the country to the south and in February:

While all else was cold, the leaves were putting forth their green foliage in the far south, and the herbs almost in bloom, the rich soil and the abundant streams of pure water and many other advantages that to us as

5 Journal History of the Church (Bound copies in Church Historians Office), Feb. 2, 1862. From a sermon given in the Tabernacle.

a people are desirable. How convenient such a climate and facilities are to a people isolated as we are. There we can raise cotton, flax, hemp, grapes, figs, sweet potatoes, and fruits of almost every kind.

The information gathered from these and other explorations into the country south of the rim was analyzed in terms of its value to the Territory. Finally, early in 1855, the first group of missionaries were called to grow cotton. These were not designated cotton missionaries, but were sent as missionaries to the Indians. Their purpose, however, in being sent south was to experiment with cotton to see if it could be successfully grown. These settled on the Santa Clara Creek not far from the present site of Santa Clara.

Experiments with Cotton Culture

The following year, 1856, Jacob Hamblin was instructed to call another group of settlers from Harmony to join the Santa Clara group for the purpose of strengthening their efforts in cotton production. Again in 1857, during the April Conference of the Latter-day Saint Church in Salt Lake City, President Young called twenty-eight additional families to leave immediately for southern Utah to give assistance to those already engaged in experimenting with cotton. Many of these settled in the new community of Washington on the banks of the Virgin River.

During the next four years many acres of land were sown in cotton on an experimental basis to determine if cot-

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*Journal History, March 17, 1852.*
ton could successfully be grown in this warm, sunny land to the south of the Church headquarters. Though the missionaries to the Indians experienced many failures and hardships in raising cotton, nevertheless, it was conclusively demonstrated that cotton could be grown in relatively large scale. It was felt by Church authorities that, with time and experience, large amounts of this staple could be raised to add materially to the economic well being of the Mormon commonwealth.

First Cotton Missionaries Sent South

The first group consisted of 300 families including people with no previous farming experience as well as those who had grown cotton in the Southern states. There were many who had recently emigrated from European countries. These included twenty Swiss families who had been in Utah but six months. This group of would-be farmers were to settle new communities along the banks of the Virgin, in many of which they were to be the first settlers. That year marked the founding of settlements such as Grafton, Harmony, Adventure, Gunlock, and others.

With the commencement of the war between the states in that year, great impetus was added to producing cotton since its supply was being curtailed. In fact, the need for more cotton within the Territory was so pressing that on October 6, 1862, at the General Conference of the Church, 200 additional families were called as cotton missionaries.
TABLE 1
COTTON SETTLEMENTS
DATES OF SETTLEMENT, ABANDONMENT AND RESETTLEMENT

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Settled</th>
<th>Abandoned</th>
<th>Resettled</th>
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<tbody>
<tr>
<td>Santa Clara</td>
<td>Dec. 1854</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Washington</td>
<td>Apr. 1857</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heberville</td>
<td>Apr. 1858</td>
<td>1861</td>
<td>1862</td>
</tr>
<tr>
<td>Toquerville</td>
<td>Apr. 1858</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heberville (Ash Creek)</td>
<td>Feb. 1858</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tonaquint</td>
<td>Apr. 1859</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Virgin City (Pocketville)</td>
<td>Oct. 1861</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Grafton</td>
<td>Oct. 1861</td>
<td>Fall 1861</td>
<td>-</td>
</tr>
<tr>
<td>Harmony</td>
<td>Oct. 1861</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>New Harmony</td>
<td>Oct. 1861</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adventure</td>
<td>Oct. 1861</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gunlock</td>
<td>Oct. 1861</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Harrisburg</td>
<td>Oct. 1861</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>St. George</td>
<td>Oct. 1861</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Duncans Retreat</td>
<td>Apr. 1863</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Rockville</td>
<td>Apr. 1863</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Springdale</td>
<td>Apr. 1863</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shoonsburg</td>
<td>Apr. 1863</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Northop</td>
<td>Apr. 1864</td>
<td>Dec. 1867</td>
<td>1875</td>
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<tr>
<td>Beaver Dams (Littlefield)</td>
<td>Apr. 1864</td>
<td>-</td>
<td>-</td>
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<tr>
<td>St. Thomas (M)</td>
<td>Jan. 1865</td>
<td>Feb. 1871</td>
<td>-</td>
</tr>
<tr>
<td>St. Joseph (M)</td>
<td>Apr. 1867</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>West Point (M)</td>
<td>Apr. 1867</td>
<td>Fall 1868</td>
<td>-</td>
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<td>Simonsville (Overton) (M)</td>
<td>1868</td>
<td>Feb. 1871</td>
<td>1871 non LDS</td>
</tr>
<tr>
<td>Logandale (M)</td>
<td>1868</td>
<td>Feb. 1871</td>
<td>1871 non LDS</td>
</tr>
<tr>
<td>Bunkerville</td>
<td>Jan. 1877</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mesquite</td>
<td>Apr. 1880</td>
<td>1885</td>
<td>1894</td>
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*Above material gathered from diaries, journals, annals, mission histories, and other Church records. (M) indicates settlement was part of the Muddy Mission.*
These left the following spring, and a part of these missionaries settled new towns such as Rockville, Springdale, Northop, Shoonsburg and Duncans Retreat.

Reports had reached Prophet Brigham Young that to the west of the present cotton settlements was a land warmer and lower in elevation with a longer growing season. Here, it was pointed out, was an area of real potential for cotton production. After careful deliberation, the authorities of the Mormon Church called a sizeable group of settlers as cotton missionaries and were to settle in this lower region. Though this group were called during the October conference of 1864, they did not depart for their fields of labor until January of the following year. The location finally selected for their efforts was about one hundred miles west of St. George on the Muddy Creek which is a tributary of the Virgin River. Their settlement was named St. Thomas, in honor of their leader Thomas Smith.

Meanwhile, another settlement about half way between the Muddy Creek and Santa Clara Creek had been made that same year. This settlement had been named Beaver Dams because of the presence of many of these structures on the creek that flowed there.\footnote{James H. McClintock, Mormon Settlement in Arizona, MS., p. 117.}

The success of cotton on the Muddy at St. Thomas the initial year of settlement there had been such that more cotton farmers were warranted. At October Conference, 1867,
158 additional men and their families were called to the Muddy. These settled in St. Joseph, but the following year this new settlement was abandoned due to Indian difficulties. Another settlement was set up, also called St. Joseph, about five miles north of the old one, and was near the present site of Logandale.

That same year, 1868, the settlement of West Point was made on the Upper Muddy near the present site of Moapa. This settlement was abandoned that same year due to Indian raids. This was unfortunate since the soil there was very fertile. The town was never resettled. Another town, two miles south of the present site of Overton, called Simonsville, was also established expressly for cotton growing.

The success in growing cotton in the Muddy settlements was great, but the mission was shortlived. Congress was busy reducing the size of the giant Territory of Utah and these settlements suddenly found themselves in Nevada, subject to taxation in gold. Not being a mining people they could not meet their obligations. The evacuation of the Muddy Mission took place in 1871.

In a number of these settlements the United Order, an institution unique to Mormondom, was established. Though the Order took on different aspects in each settlement that it was introduced, the overall purpose was the same. Under this Order, community property was held jointly by all liv-

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ing under its jurisdiction. The proceeds from the labors of all those engaged were placed in a common storehouse where all were entitled to take according to their needs. The plan worked successfully in several of the communities where it was initiated, but its success depended on the determination of the Saints to make it succeed.

The United Order had been instituted in Santa Clara in 1876, but, due to disagreements among the brethren there, it dissolved during the initial year of its existence. Some of the farmers there left for the country to the south under Edward Bunker. They settled on a fertile flat about ten miles below Beaver Dams. This settlement came to be known as Bunkerville.\(^{10}\)

Another important cotton-producing settlement, Mesquite, was settled early in 1880 by persons from St. George, Pine Valley, and Panaca, about twelve families in all. Mesquite lies on the right side of the Virgin River, about five miles northeast of Bunkerville, five miles west of the Arizona-Nevada state line. Due to the failure to build a permanent dam, this settlement was abandoned in 1885. It was later resettled in 1894 by cotton farmers from Washington County.\(^{11}\)


\(^{11}\) Andrew Jenson, *History of Moapa Stake, M3.*
CHAPTER II

THE GEOGRAPHY OF THE VIRGIN RIVER BASIN

The Virgin River Basin comprises small sections of three western states; southwest Utah, northwestern Arizona, and southeastern Nevada. Its upper waters rise in two main branches whose confluence becomes the Virgin River a short distance above the town of Rockville. The Virgin flows in a generally western direction most of its length. The Santa Clara Creek is an important tributary. It comes into the Virgin from the western side of Pine Valley mountains where it enters the Virgin just south of St. George. The Virgin then enters a 2000 foot deep gorge, and finally emerges from Box Canyon a short distance from Littlefield, Arizona. This region is a timberless desert with little that invites the eye. The second tributary of importance to the Virgin is the Muddy (Dirty Devil) which enters the Virgin at St. Thomas, twenty-five miles above the point where the Virgin joins the Colorado.

The approximate length of the Virgin River is two hundred miles. It flows through typical mountain desert country, with characteristic stretches of sage brush, creosote brush, sand areas, and in its lower valleys, expansive
and desolate regions with little growing except those plants inured to drouth and the extreme heat of long hot summer days. The river drains an area of about 11,000 square miles. The region drained is rough and mountainous, and varies in elevation from less than 1,000 feet at the river's mouth, to about 9,000 feet at its headwaters.\textsuperscript{12}

There has been much volcanic activity and tremendous geologic displacements, and in some sections of the Basin are found many faults and folds. Through these the river in past times, has cut its way, leaving narrow valleys and flood plains which at the present support the towns and villages of the Virgin Basin.\textsuperscript{13}

Much of the area is hilly, with rolling terrain, devoid of any vegetation. There are many deep gullies where water runs only after a thundershower. Erosional features are everywhere present as one would expect in an arid region. The river, in many places, lies considerably below the valley floor. The areas of intrenched rivers are very difficult to irrigate and often unused for agriculture. Amasa Lyman reported that the men from Texas said that the soil of Dixie resembled Texas soil where many had grown cotton, but others said to try to raise cotton in such a desolate, barren look-


A. Fine sand, common in Basin, showing brushy vegetation. Red sandstone cliffs, from which parent material is derived, in middle distance, and Pine Valley Mountains in far distance.

B. Wind-blown hummocky surface of Pintura fine sand. Basaltic ridge of scabland in middle distance and Pine Valley Mountains in far distance.

ing country was only a hoax to think of it. To any but the bravest heart the country was forbidding to say the least. George A. Smith said of the region, "It has the appearance of a barren country generally. The mountains were barren and bleak in appearance; red sandstone and black volcanic rock, and a variety of gray colored clay prevailing; altogether giving a kind of somber, deadly appearance".

The two main branches of the Virgin support a few small villages above their confluence. Below the point where they unite, the valley widens and it becomes possible to take the waters of the Virgin upon the higher lands not immediately upon its banks. To the south is Hurricane Ledge, 5,000 to 6,000 feet high, reaching southward for about 100 miles to the Grand Canyon of the Colorado. To the north is Kolob Plateau which forms a watershed 8,000 to 9,000 feet high. To the west of Kolob is a rough broken country, the source of La Verkin and North Creeks. Farther west rises Pine Valley Mountain Range, with its almost perennial snows which feed Ash Creek on the east and the Santa Clara on the west. These mountain watersheds are in their upper reaches typical of others in the Colorado Plateaus. There are forests of pine, spruce, aspens, maple, and oak. The shrubbery, where not overgrazed, forms ample covering to regulate the water flow. But the hills and mountains close

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Views looking northwest from the crest of the Hurricane Fault: A, Town of Hurricane, with Pine Valley Mountains in background.

B, The intensively cultivated valley of Redfield soil south of Hurricane. Note the barren volcanic cinder cone and sandstone ridges in the background.

to the river and practically all of the area extending southward to the Colorado is barren of trees and has little to attract the traveler's eye save the coloring of the landscape which contains shades of ochre, red, and vermillion, in addition to the black of volcanic lava and all shades of gray and pink limestone.

Southwest of St. George are the Virgin Mountains, 5,000 to 6,000 feet high. On the west is the Beaver Dam range of about equal elevation. The Virgin has cut its channel through a gap between the two ranges. These mountains appear forbidding and desolate, with little timber to soften their contours. They level off to form desert table lands through which the river has cut its way to the Colorado.16

Climatic Characteristics

Most of the Virgin River Basin receives inadequate precipitation for agriculture. Precipitation is erratic and often results in runoff, turning every gully into a rush-river of water. During such times extensive damage to valuable farmland can take place through gullyng of fields and removal of topsoil. Harmful deposition of sand and gravel can also occur on cropland, rendering it unfit for cultivation. Since the bed of the Virgin River is very sandy, during floods the channel of the river can be altered drastically, usually becoming shallower and wider or braided.

Flash floods can occur during the numerous electrical storms that are common to mountainous areas. Due to a lack of vegetation on surrounding hillsides of most of the Virgin River region, large amounts of water from rains descend on the bottom land with little warning.

Desert agriculture here as elsewhere suffers from seasonal droughts, usually later in the season when the weather is warmest and crops are most in need of water. Streams run dry or become so low that water for irrigation cannot be diverted onto the land. During such times the mineral content of the streams and rivers increases due to evaporation, and irrigation as well as culinary water becomes brackish.

Daytime summer temperatures in the Basin often soar above the hundred degree mark for days and even weeks at a time causing rapid evaporation of plant and ground moisture and depleting the already inadequate water supply. Such temperatures render farm work very difficult and make human existence in such an area unpleasant.

Katabatic winds, resulting from the draining of cold air off nearby mountains, was a common occurrence and harassed young, tender plant stalks.

Frosts can come unexpectedly in the Virgin Basin, as in other mid-latitude desert regions, because of the shortage of water vapor in the air. Such vapor helps to regulate air temperatures by acting as an insulating blanket between the
### Table 2

**Climatic Summary**

**Nevada**

<table>
<thead>
<tr>
<th>County</th>
<th>Station</th>
<th>Length of Record</th>
<th>January Average</th>
<th>July Average</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Length of Record</th>
<th>Last Frost in</th>
<th>First Frost in</th>
<th>Killing Frost Averages Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clark</td>
<td>Logandale</td>
<td>33</td>
<td>44.6</td>
<td>87.3</td>
<td>120</td>
<td>6</td>
<td>33</td>
<td>Mar. 19</td>
<td>Nov. 11</td>
<td>237</td>
</tr>
</tbody>
</table>

**Utah**

<table>
<thead>
<tr>
<th>County</th>
<th>Station</th>
<th>Length of Record</th>
<th>January Average</th>
<th>July Average</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Length of Record</th>
<th>Last Frost in</th>
<th>First Frost in</th>
<th>Killing Frost Averages Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington</td>
<td>St. George</td>
<td>39</td>
<td>38.4</td>
<td>82.9</td>
<td>116</td>
<td>-11</td>
<td>38</td>
<td>Apr. 10</td>
<td>Oct. 23</td>
<td>196</td>
</tr>
<tr>
<td></td>
<td>Springdale</td>
<td>32</td>
<td>39.2</td>
<td>81.4</td>
<td>112</td>
<td>-15</td>
<td>29</td>
<td>Apr. 15</td>
<td>Oct. 28</td>
<td>196</td>
</tr>
<tr>
<td></td>
<td>Leads</td>
<td>24</td>
<td>35.7</td>
<td>80.3</td>
<td>115</td>
<td>-15</td>
<td>24</td>
<td>Apr. 10</td>
<td>Nov. 5</td>
<td>209</td>
</tr>
</tbody>
</table>

---

### TABLE 3

**CLIMATIC SUMMARY**

**AVERAGE PRECIPITATION**

In Inches

<table>
<thead>
<tr>
<th>Station</th>
<th>Length of Record Yr.</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logandale</td>
<td>33</td>
<td>.79</td>
<td>.69</td>
<td>.49</td>
<td>.29</td>
<td>.14</td>
<td>.14</td>
<td>.46</td>
<td>.58</td>
<td>.30</td>
<td>.48</td>
<td>.37</td>
<td>.58</td>
<td>5.31</td>
</tr>
<tr>
<td>Hurricane</td>
<td>17</td>
<td>1.15</td>
<td>1.33</td>
<td>1.03</td>
<td>1.04</td>
<td>.67</td>
<td>.38</td>
<td>.78</td>
<td>1.00</td>
<td>.83</td>
<td>1.27</td>
<td>.62</td>
<td>.95</td>
<td>11.05</td>
</tr>
<tr>
<td>Leeds</td>
<td>27</td>
<td>1.73</td>
<td>1.93</td>
<td>1.32</td>
<td>1.05</td>
<td>.65</td>
<td>.31</td>
<td>.73</td>
<td>.92</td>
<td>.59</td>
<td>1.03</td>
<td>.77</td>
<td>1.68</td>
<td>12.71</td>
</tr>
<tr>
<td>St. George</td>
<td>40</td>
<td>.93</td>
<td>1.11</td>
<td>.88</td>
<td>.54</td>
<td>.39</td>
<td>.22</td>
<td>.88</td>
<td>.95</td>
<td>.64</td>
<td>.78</td>
<td>.57</td>
<td>.84</td>
<td>8.73</td>
</tr>
<tr>
<td>Springdale</td>
<td>32</td>
<td>1.49</td>
<td>1.75</td>
<td>1.69</td>
<td>1.17</td>
<td>.79</td>
<td>.26</td>
<td>.92</td>
<td>1.59</td>
<td>1.23</td>
<td>1.07</td>
<td>.99</td>
<td>1.36</td>
<td>14.51</td>
</tr>
</tbody>
</table>

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ground and the atmosphere, but when this water vapor is low or absent, night time temperatures can drop below freezing. Farther down the Virgin River in the settlements of Bunkerville and the Muddy, the growing season is considerably longer and the dangers from frosts reduced. But here the risks of drought are greater.

The cotton settlements on the Lower Virgin received less precipitation than those higher up, averaging from three to four inches of rain per year. The meager precipitation of the area is reflected in the scarcity of streams which flow in this region. The dry nature of the Lower Virgin country is largely due to its inland location and very low elevation. In contrast to this area, the Upper settlements in Kane and Washington counties are situated near Pine Valley and other mountains which cause moving air currents to rise, thereby affording a chance for precipitation. Here the average rainfall is ten inches per year. In addition, these settlements are higher in elevation than those farther west, and do not experience the extreme heat that the Lower settlements receive. As one would expect in mountain areas, streams are far more numerous in the higher settlements giving greater stability to agriculture.
CHAPTER III

PRODUCTION OF COTTON

The first cotton grown in the Territory was not cultivated in the sunny south, but north of Salt Lake City. In 1851 on the bench near the mountain, frost was late in coming, as late as October 6th, and it was felt that thousands of acres could be used to raise cotton. This plan was carried out and much cotton was produced that year in the Salt Lake Valley. Some of this cotton was examined by Southern cotton planters who said it was equal to the average of the Southern states.1 Others raised it in Ogden and Tooele and some was raised on Summit Creek in the southern part of the Basin for large quantity growth of cotton culture.2

The production of seed cotton in Utah began at the experimental stage since it was not known if cotton would grow there. Though cotton could grow near Salt Lake City the growing season there was too short for commercial production. Shortly afterward, cotton farmers were sent south below the rim of the Great Basin to experiment with its growth. These farmers were handicapped by a lack of adequate seed for

1Deseret News, Nov. 6, 1852 (Salt Lake City).
planting, but small amounts of several types of seeds were tried. Some were not suited to the higher altitude of Dixie, while others could not tolerate the mineral soils and waters.

The early cotton growers were not experienced with the crop and their attempts often resulted in bitter disappointments. As the seasons past, however, they gained more knowledge about the raising of this commodity. They did conclusively show that cotton culture was feasible in the Virgin River Basin.

Production of Cotton

Although cotton will grow most anywhere, it yields the most lint in areas having warm temperatures and a long growing season, therefore, the limit of cotton culture is fixed by the amount of cotton produced. For this reason large scale cotton culture is restricted to the southern climes where the amount of cotton grown is large enough to compensate for the labor expended. Cotton does well when the average temperature during the growing season is between 80 and 85 degrees F. Although the temperature in Utah's Dixie during the growing season was somewhat under this, averaging around 76 degrees F., cotton grew well.

The best conditions for cotton growing are found in climates having mild spring weather with light, frequent showers. Summers should be warm both day and night, with plenty of moisture and ending with a dry, cool, prolonged
autumn. A cool spring retards the growth. This condition occurs in southern Utah and caused several set backs. Too much rain rots the seed rather than causing germination, or later causes the development of surface roots, which results in the wilting and shedding of the leaves along with the drooping of the bolls during the heat of the summer.

Plenty of sunshine is vital to the growth of the cotton boll, especially in June and July when the plants are in bloom. With a warm climate and moisture, cotton will grow on almost all well-drained land. The yield is usually smaller in sandy soils and in heavy clays during wet seasons. According to a government prepared atlas on agriculture, "The most productive soils in the normal season are the dark colored clay lands, particularly those rich in lime, such as the black prairies and the red, brown, and black well-drained river bottom land and second bottoms." 4

Planting and Picking of Cotton

Cotton is usually planted in the late spring when the danger of frost is past. Several seeds are dropped in each hole to assure growth through the soil. The seed is not planted more than two to three inches in depth. There must be sufficient moisture in the ground to last eight or


4. Ibid., p. 8.
ten days which is the period required to bring up the cotton. The cotton growers of Utah thoroughly irrigated their land before planting so that the soil retained its moisture until the young plants put forth the fourth or sixth leaves, after coming through the surface of the ground. Early waterings before the tender plants put forth several leaves often chilled them and retarded their growth.

The seeds were usually planted in rows three or four feet apart and the plants about two feet from each other. When the cotton was a few inches high the rows needed to be thinned, called "chopping out" and was the most laborious task in the cultivation of cotton except that of picking. Frequent cultivation with the hoe or cultivator, called among pioneers a "bull tongue" induced growth of the roots and quickened the thriving outside branches to mature. Weeds were cleared constantly if the grower was to realize a good yield.

Near the middle or latter part of June the cotton plants begin to bloom. There is a bright yellow bell-shaped flower, with further opening it turns a reddish lilac or a reddish blue color the next day, and later is pushed off by the boll which grows forth from the center of the flower base. The cotton plant continues to yield its fleecy white gold until frost kills the growth of the bolls.

The cotton missionaries of Dixie realized from 250 to 600 pounds of cotton lint free from the seeds per acre.  

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5 _Ibid._, p. 10.

6 _Ibid._, pp. 10-11.
In the cotton belt of the United States, yields vary per acre from 100 to over 400 pounds.\(^7\)

Picking incurred the greatest amount of labor, and was done by hand, with three to four pickings to each field. The crop does not have to be picked as soon as the bolls open. Many in the cotton country of Utah deferred picking until late in the winter without material injury to the crop. An average picker can gather from 150 to 200 pounds of cotton per day. After the cotton has been picked, it is taken to a gin where the seeds are removed from the lint. After ginning, the cotton is baled and made ready for the spinners and then taken to the weavers.

**Cotton is Grown South of the Rim**

The missionaries to the Indians, having completed a dam across the Santa Clara by the early part of 1855, cleared land for a farm of 100 acres. That summer one quart of cotton seeds were planted experimentally, and yielded enough cotton to produce thirty yards of cloth. This cloth was shown to experienced southern cotton planters who said it was as good as any they had ever seen in the South.\(^8\) The Deseret News\(^9\) was highly commendatory when it observed: "In Governor Young's office there is a sample of cotton raised on the Santa

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\(^7\)Ibid., p. 18.


It is beautifully white, fine and silky and proves that another branch of home production can be added to swell the channel of Utah's prosperity.\(^\text{10}\)

The mission historian, Bleak, tells in the following vein of the manner in which the first manufacturing of cotton fabrics in Utah's Dixie, brought forth their product: "The workers had no gin to separate the lint from the seed, and the hand spinning wheel and thadle loom were of the most primitive make.\(^\text{11}\) This was the beginning of cotton culture in Utah's Dixie and finally led to a string of settlements along the Virgin River. The successful beginning of cotton culture in southern Utah encouraged Church authorities to the point that they "at once began to look upon cotton as an important Utah production in the future.\(^\text{12}\)

Encouraged over their successful attempt to grow cotton during the season of 1855, missionaries to the Indians renewed their efforts and planted a bushel and a half of seed on a five acre piece of land. From this they raised about 200 pounds of seed cotton, which was not a good yield, but the brethren experimenting with "King Cotton" were not disheartened. In fact, even years later, after many seasons of experience with cotton growing, the planters were satis-


\(^{11}\)Bleak, op. cit., p. 20.

\(^{12}\)Ibid., pp. 20-21.
fled if they raised one third of a crop. Seth M. Blair, an important citizen of southern extraction, in June, 1856, rated the Santa Clara and the Rio Virgin as a "medium" cotton district and predicted that the area along these streams "ought to yield 1,000 to 2,000 pounds per acre from the appearance of the seed."

During the summer of 1856, President Young requested Jacob Himblin to select several families from Harmony as missionaries to join and strengthen the Santa Clara group. These new missionaries, together with those already there, planted fifty acres into cotton, only to realize almost a total failure. The Santa Clara Creek went dry, the seed they had planted was poor and failed to germinate; the new comers were inexperienced, and due to the above adverse conditions and bad management the entire crop from the fifty acres yielded only 650 pounds of seed cotton.

Up until the fall of 1857, the cotton raised in Utah's Dixie had to be ginned by hand which was a slow and tedious process. Days and even weeks were required to separate a few pounds of lint from the seed. Zadoc K. Judd, an industrious cotton missionary, had gained some information in the South before coming to Utah about a little machine which was used

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there in the early days to separate cotton lint from the seed. He made several of these for the people of Santa Clara. He became in very deed the Eli Whitney of Utah’s Dixie. 16

Missionaries Called to Grow Cotton

During the General Conference of the Church, held at Great Salt Lake City in April of 1857, some twenty-eight families and several young unmarried men were called to settle in Washington County to experiment with cotton. The instructions of President Young to them were to go and supply the Territory with cotton. They left on the sixth of April. 17 These families settled just south of the present site of Washington on the river bottoms. At this time there was a chronic seed shortage and the amount of seed among these missionaries averaged one pound per man. However, these seeds were carefully planted and cultivated and did yield fairly well. 18

This group was later joined by twenty-two additional families who had left Payson on a similar mission call. 19

The Civil War had brought the price of cotton up from eight cents per pound to over twenty-four cents per pound and an acute shortage was inevitable to the Territory. These

16 Bleak, op. cit., Book A. p. 35.
17 Journal Discourses, Vol. 9, pp. 113-114.
18 Bleak, op. cit., p. 27.
19 Andrew Jensen, History of St. George Stake, M3., Washington Ward.
conditions gave greater importance to the Cotton Mission. By the time cotton had been freighted into the Territory it was beyond the purchasing power of the citizens. George A. Smith said in October conference of 1861: "Now we are under the necessity of paying in coin eighty cents per pound for cotton, while at the same time there are thousands of acres of land in the southern part of the Territory that we can raise it on". It was at this time during the October conference that the first call for cotton missionaries on a large scale was made. Three hundred families were called for to head south as cotton missionaries. These were to be sent to many settlements along the banks of the Virgin.

In 1861, the primary crop of the cotton missionaries was to be cotton and other crops were to be grown only to meet extreme necessity. Tithing grain was to be theirs so as to allow them to devote all their energies to cotton culture. Tithing grain proved insufficient and the cotton missionaries were forced to supply both the "staff of life" and cotton too. But the cotton missionaries were so severely handicapped by a shortage of cotton seeds that unless more could be obtained, production of cotton lint would be greatly curtailed. The Territorial Representative in Washington, D.C. was assigned

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21 Ibid., p. 114.
to send back all the cotton seed he could obtain from the Agricultural Division of the Patent Office or from seed stores. But due to the War Between the States, the representatives could only procure three quarts of Georgia Upland and the same amount of Sow Tow cotton seed.23

President Young had heard of a cotton tree, introduced into the Northern states in the hope of relieving their cotton shortage and expected to plant seed from it in Utah. If this could be done, cotton could be grown everywhere in Utah as the tree was especially resistant to cold climates. It attained a height of from twelve to twenty feet.24

During the winter of 1861-62 the Virgin River Basin experienced a most terrible flood and continuous rain for forty days. The cotton was not planted until the first of June. The six pounds of seed received from the Territorial Representative would not plant a quarter acre, for ordinarily, a bushel of seed is required to plant one acre of land.25 Therefore, the bulk of their seed was obtained from Santa Clara and Washington. Even though the first seed was not planted until June, that year's total yield of seed cotton was 100,000 pounds which was very encouraging to the cotton missionaries.26 These missionaries made some of this cotton

23Journal History, Dec. 9, 1861. Letter from the Honorable John M. Bernhisel to George A. Smith.


25Stine, op. cit., Section A, "cotton".

26Barrett, op. cit., pp. 139-140.
up into clothing; President Young bought some at forty-five cents per pound, but Dixie farmers still were unable to dispose of a large portion of their crop. Because of this, the cotton crop of 1863 was much smaller than the first years harvest.  

At the October conference of the Church in Salt Lake City, two hundred additional families were called on cotton missions and were to leave as soon as possible.28

Throughout all the settlements along the Virgin, many acres were sown with cotton. In the little settlement of Grafton alone, twenty-four men under Bishop Covington planted 100 acres into cotton. He later reported that the cotton in his region was better than that produced in Tennesses and equal to that produced in the Carolinas. As he had come from the South, he spoke authoritatively.29

The official cotton price on the New York market in 1863 for middling upland was ninety-three cents for the best grade lint and fifty-one cents for the poorer grades. In Utah's Dixie cotton lint was priced at fifty cents a pound.30 The yield of cotton for that year was about one-half the amount raised during the year of 1862, but due to promises made by

27 The Yepricula, June 1, 1864, p. 16. Newspaper written in St. George.
30 Ibid., p. 130.
TABLE 4
COTTON CROP OF 1863

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Pounds Produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington</td>
<td>21,500</td>
</tr>
<tr>
<td>St. George</td>
<td>8,500</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>6,810</td>
</tr>
<tr>
<td>Grafton</td>
<td>4,784</td>
</tr>
<tr>
<td>Toquerville and</td>
<td>14,500</td>
</tr>
<tr>
<td>Virgin</td>
<td>56,094 pounds</td>
</tr>
</tbody>
</table>

*aBleak, op. cit., p. 129.*

Brigham Young thought that markets for their product would be obtained, more acres were planted into cotton in 1864 than any previous time. Every settlement along the Virgin grew cotton. The price on cotton kept climbing as the war aggravated the cotton shortage. Prices paid for cotton on the New York market for 1864 showed $1.90 paid per pound for the best grade and seventy-two cents paid for the lowest grade. In Utah the standard prices were $1.00 and $1.25 per pound. These prices were arrived at by a committee appointed at the mission conference held November 4, 1864.

Cotton Crop for 1865

The crop of 1865 was poor, due mostly to the ravages of grasshoppers which infested the region causing considerable

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*Barrett, op. cit., p. 150.*
destruction to all the crops. In the Upper Virgin settlements of Hurricane, Toquerville, La Verkin, Virgin City, Duncans Retreat, and Grafton, worms destroyed many acres of cotton.

TABLE 5

COTTON ACREAGE IN 1864

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harrisburg</td>
<td>8</td>
</tr>
<tr>
<td>Toquerville</td>
<td>84</td>
</tr>
<tr>
<td>Virgin City</td>
<td>53½</td>
</tr>
<tr>
<td>Shoonsburg</td>
<td>13</td>
</tr>
<tr>
<td>Duncans Retreat</td>
<td>6</td>
</tr>
<tr>
<td>Northop</td>
<td>4</td>
</tr>
<tr>
<td>Grafton</td>
<td>28 (28 families)</td>
</tr>
<tr>
<td>Rockville</td>
<td>25</td>
</tr>
<tr>
<td>Springdale</td>
<td>35 (9 families)</td>
</tr>
<tr>
<td>Washington</td>
<td>140</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>296½ acres</td>
</tr>
</tbody>
</table>


Entire patches were left leafless. The crop for this year was not reported, but would have been very slight if it were not for the 5,000 pounds raised on the Muddy, the initial year of the settlement there. Cotton production was so good there that a man named Rhodes had harvested 695 pounds of

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first class cotton lint from one acre.  

Cotton Crop for 1866

TABLE 6

COTTON ACREAGE IN 1866

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. George</td>
<td>80</td>
</tr>
<tr>
<td>Washington</td>
<td>112</td>
</tr>
<tr>
<td>Toquerville</td>
<td>67½</td>
</tr>
<tr>
<td>Upper River Settlements:</td>
<td></td>
</tr>
<tr>
<td>Grafton, Hurricane, Duncans</td>
<td>140</td>
</tr>
<tr>
<td>Retreat, La Verkin, Mountain</td>
<td></td>
</tr>
<tr>
<td>Dell.</td>
<td></td>
</tr>
<tr>
<td>The Muddy Settlements (new)</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>447½</td>
</tr>
</tbody>
</table>


Due to Indian troubles involving the picking of the Saints' food crops and driving away and killing their livestock and threatening the settlers, the cotton crops were sadly neglected. At the semi-annual conference of the Cotton Mission held in St. George on November 1, the Bishops of the various wards reported that cotton yields would be less than three-quarters of the normal crop.  

There was no report made as to the number of pounds harvested for 1866, but the market price for cotton had gone down to fifty-

\[33\text{Bleak, op. cit., p. 202.}\]

\[34\text{Ibid., p. 234.}\]
two cents per pound in New York, and in Utah the Territorial Court had authorized the price of fifty cents per pound for raw cotton and $6.00 for five pounds of cotton yarn.  

The Muddy Mission

The first settlements on the Muddy were part of the Cotton Mission and were made in 1865. By cotton planting time of 1866 there were on the Muddy sufficient families to begin extensive cotton culture.

### TABLE 7

**COTTON STATISTICS FOR THE MUDDY IN 1866**

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Men Engaged</th>
<th>Persons Engaged</th>
<th>Acres</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Thomas</td>
<td>40</td>
<td>129</td>
<td>24</td>
<td>5,000</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>35</td>
<td>167</td>
<td>23½</td>
<td>6,000</td>
</tr>
</tbody>
</table>

*Journal History, Oct. 15, 1866.*

During the first year the cotton missionaries on the Muddy raised over 5,000 pounds of ginned cotton. The actual acreage planted to the "white gold" was not reported, but many farmers had unusually heavy yields per acre. To illustrate, Preston Lamb picked one acre of cotton six times. From each picking, he realized two hundred pounds of seed cotton. The seventh picking he gathered almost three hundred pounds of seed cotton. From this one acre he obtained nearly fifteen

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hundred pounds of cotton in the seed, which would gin up to
well over five hundred pounds of lint. A Brother Rhodes har­
vested an even larger yield, for he ginned out six hundred
pounds of cotton and was unable to gather the last picking,
which was wasted. Another thrifty cotton grower, R. M. Engle­
stead, raised six hundred pounds of ginned cotton from three­
quarters of an acre. This was all first class cotton. Orrawell Simmons had built a cotton gin on his farm in the
Muddy Valley and some folks did gin their lint there, but
most of the cotton harvested there was hauled to the cotton
factory at Washington for processing.

TABLE 8
Cotton Statistics for the
Muddy for 1867

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Pounds, 1st Class Ginned Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mill Point</td>
<td>14,600</td>
</tr>
<tr>
<td>Muddy Valley Farms</td>
<td>25,000</td>
</tr>
</tbody>
</table>

Jacob Hamblin, after having spent some time in St. Thomas,
told the brethren that "the cotton crop of last year was so
much beyond what was anticipated that no doubt exists about
it (the Muddy) being a good cotton growing country and much
more will be planted the coming season than heretofore".

15:61, also 118.

37Journal History, April 15, 1868.
To strengthen this newly established cotton mission, 158 men and their families were called at the General Conference of the Church in October of 1867. Of these only eighty eventually reached their destination.\(^{38}\)

The cotton crop of 1868 included between 200 and 250 acres. The yield per acre was estimated at 400 pounds for a total of from 80,000 to 100,000 pounds of ginned cotton.\(^{39}\) But due to hordes of grasshoppers which caused serious damage, the yield for the Muddy Mission in 1868 was only 50,000 pounds.\(^{40}\)

The following year, 1869, was very dry and water was extremely scarce. The only cotton of any consequence produced in the Muddy was in the new settlement of West Point.\(^{41}\) The cotton crop on the Muddy for 1870 was small, the aggregate yield being 25,000 pounds.\(^{42}\) The United States Census of 1870 showed the population of the Muddy Mission to be 590.\(^{43}\) This indicates that a continuous stream of settlers had been drawn there, probably by the success of cotton growing.

However, this was the last year of cotton production on the Muddy since the mission was abandoned due to boundary

\(^{38}\) Bleak, op. cit., p. 257.
\(^{39}\) Report, in conference at St. George, Bleak, op. cit., p. 263.
\(^{40}\) "Cotton Culture in Southern Utah," Journal History, 1868.
\(^{41}\) Bleak, op. cit., Book B, pp. 6-7.
\(^{43}\) Ibid., p. 132.
changes placing it in Nevada where taxes were too high. In fact, it became the chief source of the cotton supply and the abandonment of the mission created a problem as to where sufficient cotton could be grown to assure full production at the factory and supply the citizens of the Territory. It is estimated that during the six years cotton was grown on the Muddy, almost 150,000 pounds of ginned cotton was produced. Naturally the loss of such a cotton supply would create a problem, the solution of which was never satisfactorily made.  

From 1866 to 1870 cotton degenerated partly because the Civil War had ended and Southern cotton was again available which had lowered the price of cotton, and partly from grasshopper invasions and drought. The supply was further cut by the evacuation of the Muddy Mission in 1870, which had been the largest producer of raw cotton. At this point, President Erastus Snow in a general epistle to the Saints in St. George, Washington, Santa Clara, Toquerville, Virgin City, and Rockville, urged the brethren to grow more cotton. He told them to make an extra effort to produce cotton now that the Muddy Mission was closed and that the entire responsibility for producing cotton for the fast growing State of Deseret was now placed on their shoulders. They were now to produce more cotton than ever before. The Saints did rally to the cause.

44 Barrett, op. cit., pp. 196-197.
46 Ibid., p. 132.
47 Bleak, op. cit., pp. 133-134.
However, the exact yield for each year between 1870 and 1875 is not given in the records.

In 1869 the new cotton factory at Washington began operations. At least 100,000 pounds of cotton lint needed to be raised to keep it in full production. To procure this amount, it was felt that cooperative organizations would be the best system to be used. Each settlement was to be apportioned a certain amount of lint to be raised and ginned each year. The standard price for cotton as regulated by the committee was as follows:

- Cotton Ginned per pound: 20-25 cents
- Cotton Unginned per pound: 5-7 cents
- Cotton Seed per pound: 1½ cents


In the winter of 1874-1875, the Brigham City Cooperative Enterprise needed cotton. Seventeen men were selected and sent to the Virgin River region for this purpose. The first year enough cotton was raised and sent to Brigham City to produce 70,000 yards of warp. The second year more than 150,000 yards of cotton warp were produced from the Brigham City cotton farm, commonly called Camp Lorenzo.*

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50 Eliza R. Snow, Biography and Family Record of Lorenzo Snow, MS., p. 294.

51 Bleak, op. cit., Book C, p. 62.
The United Order functioned in Santa Clara and St. George until 1877, when it broke up due to dissatisfaction.

At this time, in January of 1877, a meeting was held in Santa Clara to decide where a good location for a new colony should be. The Santa Clara people decided to settle on the bottom lands of the Lower Virgin. The newly organized company under Edward Bunker set out the next day, January 2. They arrived on Mesquite Flat, and crossed over the river and settled on the south side. A few months later, in April, cotton planting began and continued until the ninth of June. The first year fourteen acres were planted into cotton. That year 9,040 pounds of lint was ginned. In 1878, the following year, 30,000 pounds of seed cotton were picked.

Records after this date are scanty, as was cotton production, due mainly to a shortage of water. But the people of the Lower Virgin Valley raised cotton until 1910, when other things came along that were more profitable, so cotton raising was discontinued.

A settlement on the Mesquite Flat was made in 1894, but attempts at cotton culture met with failure. Some cotton was grown on the north side of the Virgin, however. Neither

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52 Edward Bunker, Senior, Biography, p. 5. Quoted in Francis H. Leavitt's Influence of the Mormon People in the Settlement of Clark County, p. 125.


54 Ibid., p. 137.

55 Barrett, op. cit., p. 291.
the number of acres planted, nor the yield of cotton for any year is on record. During the thirty odd years that cotton was grown on the Lower Virgin, thousands of pounds of lint were manufactured into cloth and thread, which augmented materially the supply of cotton fabrics within the colonies of the Mormon commonwealth.56

From 1866 to 1870 cotton degenerated in the Washington Field and the Upper Virgin Settlements. Probably several reasons are responsible. The conclusion of the war caused a rapid drop in cotton prices. The completion of the trans-continental railroad brought about the importation of cheaper cotton into the Territory. Many her-to-fore energetic planters became disgruntled and left. Men went to the mines in Pioche, Nevada, and other mining towns. One reason for the uneasiness among the cotton missionaries and the desertion of the mission by many according to the mission secretary, was "the drought and grasshopper damage. The cause behind the poor crops can be explained by the fact that the growers had become careless in selecting proper seed".57

When the cotton factory began operation in 1869 it was uncertain whether there would be sufficient cotton grown to keep the factory in operation, especially if the cotton crops continued to be as poor as they had been during the last few years.

56 Ibid., pp. 292-293.
57 Bleak, op. cit., p. 138.
Because of the priority placed on cotton over other crops, this plant tended to occupy the choicest agricultural land. Such areas were relatively free from alkali and other mineral deposits. The areas designated on the maps in this study indicate where cotton was most commonly grown. They are the flat, well-drained lands, for they were notably conducive to the growth of the cotton plant. They are principally those areas with soils that retain water at upper levels, but are well-drained at lower depths. In addition, this land was located such that it could be irrigated by the river water without too much leveling and elaborate ditch making. The areas designated are more clayey than sandy in composition since the former gave larger cotton yields than the latter.

The Milling of Cotton

The Washington mill began operations in 1867. The factory had spinning machinery of sufficient capacity to work up 250 pounds of wool and 260 pounds of cotton per day. This was enough to keep thirty looms constantly in operation, but they had only fourteen looms, eight of which were newly imported. With the fourteen looms, 560 yards of plain factory cotton cloth could be woven in a day.\(^{58}\) The biggest handicap in milling the cotton was the lack of experienced workmen at the looms. Plans were in the making, when workers at the looms acquired more experience, to have one person operate three or even four looms, instead of only one as they were then doing.

\(^{58}\) The Salt Lake Herald, September 22, 1870.
Areas of Cotton Production
Santa Clara
Bloomington
St. George

scale 1: 62500
Areas of Cotton Production
Washington
Hurricane
La Verkin

Scale 1:62500
The sizing of the cotton, which was formerly done with hot water, with the new equipment was done by steam, and 1200 yards were sized each day.\footnote{Barrett, \textit{op. cit.}, p. 246.}

**Milling of Cotton into Cloth**

When baled cotton was brought into the factory by the grower, it was first put on an apron lapping machine. This contrivance rolled the lint into rolls for the carding machine. The carder stretched the cotton and layed it length wise so that by the time it got to the spinners, all the fibers were parallel. According to James Hall of Washington, who worked for many years in the factory, there were four spinners, each of which was "as long as a house". The cotton from the spinners was ready for the looms, to be woven into cloth. Plain all white cotton cloth was called "factory". That which was checked or striped, with a cotton warp and wool filling was called "jeans". Linsey was of cotton warp and woolen filling. Table cloths and napkins were made on a loom, also.

Before cloth could be made from the wool, it had to be washed and put on a picker, which picked the wool to pieces. It was then put on a carder, supplied with wire teeth. After that, it was delivered to a cylinder where it was oiled to keep it from flying about. From the cylinder, it went on the mule or jinny to be stretched and prepared for the weaving. But even after the woolen cloth was woven, it was not finished,
for it had to be placed in a vat of fuller's earth to remove the oil from it, and then rinsed. After this was done, the cloth had to dry in the drying room, and have the fibers sheered off with a machine. Then the cloth was pressed in a huge pressing machine. Both the cotton and woolen yarn was coarse, but durable. Men's shirts and women's dresses, made of cloth from this yarn, were said never to wear out.60

In 1872 the quoted prices of fabrics manufactured by the Washington mill were:

TABLE 9

PRICE OF COTTON FACTORY TEXTILES FOR 1872

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeans</td>
<td>$1.00 per yard</td>
</tr>
<tr>
<td>Red and Black Tweed</td>
<td>.90 per yard</td>
</tr>
<tr>
<td>Purple and Black Tweed</td>
<td>.85 per yard</td>
</tr>
<tr>
<td>Black and White Flannel</td>
<td>.80 per yard</td>
</tr>
<tr>
<td>Shirts</td>
<td>2.75 each</td>
</tr>
<tr>
<td>Pants</td>
<td>4.00 each</td>
</tr>
<tr>
<td>Cotton Batting</td>
<td>.35 per pound</td>
</tr>
<tr>
<td>Cotton Yarn</td>
<td>3.00 per bunch</td>
</tr>
<tr>
<td>Yarn Doubled and Twisted for Stockings, etc.</td>
<td>3.75 per bunch</td>
</tr>
<tr>
<td>Table Cloths</td>
<td>.40 per yard</td>
</tr>
<tr>
<td>Wagon Covers</td>
<td>no price listed</td>
</tr>
</tbody>
</table>

60 Barrett, op. cit., p. 246.
A variety of cloth was turned out by the looms at the rate of seventeen or eighteen hundred yards a week. The Superintendent, Birch, wrote: "You may safely say to the people that the factory is now doing well and is able to compete with Eastern goods both in price and quality". This was in 1873.

\[61\text{Ibid., p. 37-42.}\]
CHAPTER IV

THE EFFECT OF THE PHYSICAL ENVIRONMENT ON COTTON PRODUCTION

An area had been found in the Territory where cotton could be raised, but there were handicaps involved in its production. Problems arose from the necessity of irrigating the cotton fields. The pioneers of Dixie needed a consistent supply of water for irrigation. Other problems were caused by erratic precipitation resulting in floods which caused harmful erosion and deposition. There were also the problems associated with minerals in the soil and water which curtailed the growth of cotton. Insects and diseases also vexed these cotton planters and took their toll in the amount of cotton grown. [The Valley of the Muddy was settled mainly because the climate and soil were well adapted to cotton culture.]

The season was considerably longer than at St. George and the weather slightly warmer. The trouble from floods was never serious as it was on the Virgin, except in the ravines in the hills during thunder showers when minor damage was caused by gushing runoff water. The Muddy was a clear stream, notwithstanding its name; hence, the sand problem was not bother-

1Deseret News, June 19, 1868, Letter from Joseph W. Young.
some (It got its name from pioneers going to California because after their teams and wagons had passed through the stream it was truly muddy).

The Arid Nature of Dixie

It must be realized that cotton culture in Utah was attempted in an arid region, therefore, all the problems associated with an arid climate had to be faced by those engaged in cotton production. So great were the problems presented by the climate throughout all of the Virgin River Basin that many times the normal labor requirement for cotton was demanded if cotton was to be grown at all.

Precipitation in arid climates is very unreliable. The average yearly rainfall over a five year period may be twenty-five inches, but twenty of those inches may fall in one year, leaving only five inches of precipitation to be distributed among the other four years. Agriculture in such an area is obviously impossible without irrigation. But if the supply of water for irrigation is spotty, then drought and crop failure will result. Not to be ignored is the effect such irregular precipitation will have on the river regime. During the year of greatest rainfall, streams will be swollen and capable of much destruction during flooding through erosion or deposition. Much good farmland may be entirely washed away, or receive such heavy loads of debris that it is rendered useless. During the years of low rainfall when evaporation exceeds precipitation, sediments are deposited on the
land as soil and irrigation water evaporates. When the irrigation water carries a high sediment load, which often is the case in arid zones, these sediments must of necessity be carried in upon the land in order to supply crops with water.

Such were only a few of the problems the cotton missionaries were faced with and were forced to either solve or leave the area. Shortage of water has been the ever present problem of the settlers on the Santa Clara, and Jacob Hamblin and his associates were quick to experience this problem. In 1856 they planted the first cotton in Santa Clara. By mid-June the water in the creek was practically dried up, just as the heat of the long summer days made frequent irrigation imperative. By the end of June the creek was completely dried up and the entire fifty acres of cotton that had been planted had almost entirely died. Only 650 pounds of seed cotton was realized.

Water shortages continued into 1857. James H. Martineau visited the settlements of Washington and Santa Clara in September of that year, and observed, at the latter place that "the crops were much injured by the drouth, the river having entirely dried up so that it does not reach them". The crops were not a total loss, however. George A. Smith spoke encouraging of the cotton, indigo, melons and grape vines. The following year, 1858, was evidently a better

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2 Journal History, July-Dec. 1858.
4 Journal History, Aug. 18, 1857.
time so far as water was concerned. Smith reported that some of the cotton had not come up, though some nine acres showed a good stand. "The land was very productive," he said, "the only drawback being scarcity of water." Harmony was abandoned because it was noted early by the settlers that each spring the waters of Ash Creek and Kanarra Creek evaporated or sank in the sands before reaching the village. The settlers decided to move nearer the head of the stream and, consequently, founded New Harmony.

Despite water shortages and other occasional setbacks, Santa Clara made steady progress toward stability and permanency. For this its settlers paid the price of hard labor and constant toil. In 1863 the waters of the Santa Clara failed in mid-season and a greater part of the crops dried up, as well as thousands of trees and vines. This condition was aggravated by the fact that the citizens of St. George had opened up a field on the creek below Santa Clara, they having been granted the right to control the waters of the Santa Clara by the Territorial Court, on the provision that those already on the stream (the Santa Clara people) would have equal water rights. But the St. George citizens seemed to have assumed that they had equal rights with the Santa Clara people. Hence, in dry seasons there was not enough water for both fields, and both suffered. As a result

5Ibid., July 30, 1857.
6Deseret News, 16:165.
there was an exodus of settlers from Santa Clara. Nearly half of the people there moved west to Clover and Panaca.7

In 1864 crops were better, but still limited by the scarcity of water. The season of 1865 was more favorable and a good crop was raised. The same was true of 1866. Farming operations were again successful in 1867.8

The land was of excellent quality, but the assurance of a harvest was always lacking because of the probability of the water being out just when the crops needed it most. This pattern of one or two dry years followed by three or four moderately wet years was repeated time and time again.

The water shortages in the Santa Clara continued to cause friction between the settlers of Santa Clara and the St. George farmers. Again in June of 1871 the water in the creek became very low. The water shortage was intensified by the extreme heat that prevailed that summer. At a session of the Washington County Court, held December fourth, 1871, a petition was presented asking for a special session to be held and an investigation to be made into the "already acquired rights" and to ascertain just what these water rights were. The petition was granted.9

This dispute was solved through court action, but

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7 James G. Bleak, Annals of the Southern Mission, M3, Book A, p. 120.
8 Ibid., pp. 183, 152-153, 231-234.
others remained. There were settlers on the stream above Santa Clara who used the water, and being on the upper reaches of the stream were in a position of advantage over those lower down. In dry seasons, which came often on the Santa Clara, they took more than their share of the shrunken stream, or at least it seemed thus to those below; and there was constant trouble over the amount to be allowed to run down to those settlers at Santa Clara, whose claims were prior to those above. Much time was lost running up the creek for nearly thirty miles to get all the water-users to allow the water to come down a certain part of the time. Resort to law was necessary to insure the flow and prevent those on the stream above from breaking their verbal agreements to let the water alone while the people of St. George and Santa Clara Fields did their irrigating.  

With water shortages such as these it is obvious that constant large scale production of cotton would be difficult if not impossible in this country. Ordinarily, under such adverse conditions, attempts at cotton culture would have been abandoned, but these farmers were not ordinary farmers. They had been sent there on missions and were not about to accept failure. Yet, something drastic needed to be done if cotton was to be raised in the future, and their leaders told them that cotton was critical to the welfare of the Saints. It was  

10John S. Stucki, Journal, pp. 66-68. Typed copy in Brigham Young University Library.
at this time, and in the face of such obstacles, that the United Order was initiated throughout all this region, and is directly attributive to the continuation of cotton growing in the Basin because of the manner in which it unified and concentrated the energies of all engaged. Losses of a few were absorbed by the successes of the rest, as all property was held in common.

Regime of the Virgin

The life blood of the Basin is the Virgin River. Without this river there would be no irrigation water since the region is arid, having a very low water table and only a few small springs. Without the river, agriculture here would be impossible. But unfortunately, even with the river, agriculture is still very difficult. Part of the reason for this is the arid nature of the Basin itself. Streams in such regions are subject to great variations in flow and the Virgin is no exception.

No records of the amount of water discharged into the Colorado River from the Virgin are available prior to the time when its waters were diverted for irrigation. What records are available were compiled early in the twentieth century. They are rather incomplete and not too accurate, and it is difficult to say just what the run-off was prior to irrigation as compared with such recordings as have been taken. The amount of run-off now is comparatively small, since practically all of the normal flow is used for irrigation during the lat-
ter part of the irrigation season. The Virgin is irregular in flow and subject to sudden floods which carry a great amount of sediment in suspension.\[^{11}\]

The bed of the river with its shifting sands has exacted its price in human toil, hardship and discouragement and the fact that the river today is subdued through the untiring efforts of the early settlers stands as a monument to their dedication.

The records of run-off cover the period from April 18, 1909 to September 30, 1914. The measurements were taken about one-half mile east of Virgin, Utah, at a point about 600 feet below the mouth of North Creek. The highest maximum discharge for a single day was in September of 1911 when 10,600 second feet were measured. The mean high for the period was 505 second-feet, while the mean low was 130 second-feet. Through the period, the month of July showed the highest mean run-off, 1552 second-feet for a single day. It also showed the lowest mean run-off, 86.5 second-feet.\[^{12}\]

The irregularity in flow of the Virgin River is the result of the frequent July thunder showers which for brief periods make the river a roaring torrent; but when the weather is hot and clear, as July frequently is, the river is low. Now that the natural flow is, during the latter part of the irrigation season, used entirely for irrigation purposes,

\[^{11}\]E. C. La Rue, *The Colorado River and Its Utilization*, p. 94.

\[^{12}\]Ibid., p. 109.
the river is not a continuous stream. No water passes from Long Valley, on East Fork, to the stream below, and the bed is dry in the canyon below St. George. In the lower canyon, springs again replenish the river, but farther down it again becomes dry by early summer, and in dry seasons as early as mid-May. Thus it remains, except for temporary intervals of flood water, until the cool weather again comes.\(^{13}\)

In addition to the depletion of the stream from irrigation diversions, there is considerable loss from evaporation and seepage, for where the river widens, the stream is shallowly spread over a wide expanse of quicksand where it makes its sluggish way until vanquished by sand and sun.\(^{14}\)

Measurements showing monthly fluctuation in stream volume were taken on the Virgin 600 feet below the mouth of North Creek. The months of least total run-off, in their order are, November, (49,560 acre feet) December, August and February. The months of greatest total run-off are April, (210,800 acre feet), May, March, and January. The highest run-off for one single month was recorded in April, 1911 (55,800 acre feet), and the month in which the river carried the least was July, 1909 (6,150 acre feet). The highest mean was the April flow of 35,600 acre feet, while December showed the lowest mean with 9,040. The highest for a year was the period from October 1, 1910 to September 30, 1911 when a dis-

\(^{13}\)Elwood Mead, \textit{op. cit.}, p. 209.

\(^{14}\)\textit{Loc. cit.}
charge of 320,000 acre feet was recorded; and the lowest run-
off for a similar period was from October 1, 1911 to September
30, 1912, during which 136,000 acre feet were measured. 15

Measurements on the Santa Clara made during the period
from April 16, 1909, to January 31, 1913 are not of sufficient
significance to consider here. The recordings were made about
three miles above the mouth of the creek; but little of the
natural flow reaches this point a greater part of the year,
since it is diverted for irrigation at points farther up the
creek. 16

A serious obstacle to settlement on the lower Virgin
was that the settlers would have to use the waters of the Vir-
gin for culinary purposes, and it was bad tasting and brack-
ish, especially in low season, from the sulphur and salt it
carried. For this reason alone, settlement in Bunkerville
did not occur for twelve years. 17 After being settled on
January 5, 1877, the town of Bunkerville depended on the ir-
rigation canal for its culinary water supply, and when the
water was out the people had to haul their water in barrels
from the river. The water was usually very muddy and had to
be settled before it could be used. This settling process
often took hours until they discovered that a little milk

15La Rue, op. cit., p. 109.
16The data on these measurements is recorded in La
Rue, op. cit., p. 110.
17Larson, op. cit., p. 238.
would hasten the process. Likewise a small amount of the inner pulp of the cactus would do the trick without changing the taste.  

Low Water Table

The new town of St. George depended for its culinary water on two groups of springs. These were too small to adequately water the land upon which the settlers made their homes. The water available was divided to flow down the ditches of the city streets where it could be used for irrigating and for household purposes, watering the livestock and so forth. Various means were suggested and some tried in order to relieve the water situation, for it was felt, and with sound, good sense, that without more water the city's growth must be limited. One of the first things suggested to increase the water supply was the boring of an artesian well in the public square. The project got underway with great vigor. Much expense was incurred before the project was finally abandoned as a hopeless adventure. The well was sunk to a depth of more than 200 feet and $5,000 was expended upon it. Its failure to add to the water supply was a bitter disappointment, and there were those who thought the drilling should be continued.

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20 *The Cactus*, Feb. 20, 1869.
The artesian well failure gives mute evidence as to the arid nature of the region and the low level of the water table there. Interestingly enough, the flow of the Santa Clara watered more land in the mid-1870's than it did previously. The flow of the stream greatly increased, the floods having seemingly opened new springs. One old settler says an earthquake increased the flow, also.

Other Climatic Characteristics

The Upper Virgin settlements receive much more rain than those settlements farther down the river on the Nevada side of the Basin. This is largely attributable to the presence of mountain ranges in the immediate vicinity of the Upper settlements which encourage precipitation.

The mean annual precipitation for St. George is 6.31 inches, and the mean annual temperature is 57.6 degrees F. The months of least mean rainfall are June, September, November, and May. Months of greatest precipitation are August, February, January, and March. Except during cloudbursts much of the rainfall never reaches the river.

What were undoubtedly the coldest days ever recorded at St. George were January 22 and January 26, 1937, when a -11 degrees F. was registered. The month's mean maximum and minimum were 32.9 and 10.6 degrees F., respectively. The monthly mean

\[21\text{History of St. George Stake, M3.}\]
\[22\text{Stucki, op. cit., p. 68.}\]
\[23\text{Mead, op. cit., pp. 208-209.}\]
was 21.7 as compared with a normal mean of 37.9 degrees F. These are the lowest figures on record.  

The growing season fits fairly well with the demands of cotton. The supply of moisture is retarded during the fall harvest as is required. Frosts are known to come early and late in the year and are responsible for many crop failures. Dry, cold winters with little or no rain are the rule so that the water used in the region comes almost entirely from the river which is fed by snow packs in its head waters. Early springs with unseasonably warm temperatures are very common and cause disastrous floods.

Sometimes frosts were delayed longer than usual and in such instances heavy yields of cotton were realized. Such a year was 1874. Due to the backward spring that year, cotton was planted late, but the summer proved pleasant and agreeable to the growth and development of the plants: the frosts delayed their visits until an abundance of cotton was harvested. But often the frosts were not delayed, and such frosts killed prospective harvests. On October 16, 1881 such a frost came, and again the night of October 24, 1883.

Cotton culture became more firmly established as time

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25 Documentary History, 3394.

and experience gave the settlers a knowledge of what was necessary to succeed in the venture. They discovered the length of the growing season and thus came to know when the cotton could be safely planted.

St. George averages 193 days without frost per year. Leeds, at a higher elevation, averages 208 frost free days in the year. The more pronounced air drainage at Leeds probably accounts for this difference.  

According to William Abbott who was a resident of Bunkerville, the winds were a menace to his cotton plants. He recorded in his diary the following:

Almost every day the wind blew. It was not a zephyr blowing gently from the west to soothe the flushed cheeks of the malaria victim, but blasts tempestuous enough to uproot the wheat crops and snap the tender cotton stalks off near the roots.

Trees were planted as windbreaks which served effectively. Another settler on the Lower Virgin had this to say about the winds at Bunkerville which, at times, uprooted the young cotton stocks: "The wind has blowed very hard all day. It has blowed our cotton nearly all up and a great deal of the rest of the other folkses cotton".

Another characteristic of arid climates, and one which decidedly worked against the cotton growers, is that such

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28 Abbott, op. cit., entry for March 5, 1880.

29 Andrew Jenson, History of Moapa Stake M3.
climates are subject to rapid temperature fluctuation; extremes in temperature from one week to the next. Just as rainfall is unpredictable in desert areas so is the temperature regime. In Dixie a sudden warming trend often occurred in early or late winter and especially in the spring. The immediate result of such a condition was the large scale melting of the snowpack. The surge of melt water was often beyond the capacity of the streams and rivers to carry, and flooding would ensue. This condition was aggravated by the presence of large areas of bare rock in the Zion's Park region. Because of this, runoff from precipitation was great in the head waters of the Virgin and flooding occurred even in the highest settlements. When one considers the frequency of the floods and the extent of damage they caused and the consequent effect on cotton production, it is nothing short of miraculous that so much cotton was produced in the face of such odds.

Flooding and Its Impact

Many eye witness accounts describe the effect the floods had on the Basin. The forces of erosion and deposition were often great enough to transform the entire landscape. The first year that serious cotton culture was attempted in the Basin a disastrous flood occurred. We read in one pio-

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31 Ibid.
neer's journal: "The Rio Virgin is notorious for its disastrous floods but seldom if ever has she been on such a rampage as during the winter of 1861-1862." Every resident of Washington County who has left a journal or memoirs speaks of the forty-day rain and the calamitous effects of the floods. Farms, orchards and homes were swept away in the deluge. Even some lives were taken by the ravaging waters. Because of these continuous rains almost all work was suspended. One eyewitness has said that "the whole country seemed as if the bottom had fallen out." It was not until after the first of June that cotton was planted. Because of the late planting the cotton yield was far smaller than it would have been under more favorable conditions. The forces of erosion and deposition had greatly altered the landscape and caused land destruction. This flood washed away much of the land which had been farmed earlier. Other land was covered with from two to six feet of sand by the silt-laden flood water. Many acres of good farm land supporting orchards, vineyards and cotton were lost.

The impact of the floods was felt everywhere in the Virgin River Basin from the Upper settlements down to the settlements on the Lower Virgin. Even Mountain Dell on North Creek suffered. It was settled during the fall and winter

33 Ibid., pp. 94-95
34 Ibid., p. 119.
35 Ibid., p. 73.
of 1863-1864. Since its land was limited, the place could not grow; in fact, the floods reduced the arable land as time passed, and its population declined as did its cotton acreage. 36 Floods occurred every year at least two or three times and in many years they occurred even more often, each time greatly hindering the production of cotton in the Basin. The settlements of Northop and Shunesburg were settled around 1862. Both were limited by the small amount of land. When the yearly floods came they washed away much of the little land that was available and cotton production here ceased. 37 At Virgin the floods were washing away a very large portion of the bottom farming lands, which were not extensive to begin with. 38 Littlefield, settled in 1864 expressly for cotton production, was also hampered. In 1867, at the close of the year, an unusually large flood in the Virgin submerged the little village and washed away a considerable amount of the tillable land. The cotton was destroyed and the settlement abandoned. 39 The numerous floods at Bunkerville, a prime cotton growing settlement, led the settlers at various times to consider seriously the abandonment of the place, but always the decision to hang on and try again prevailed. 40

36 Bleak, op. cit., p. 233.
37 Andrew Jenson, History of Zion Park Stake, M3.
38 Deseret News, Feb. 12, 1862.
39 Andrew Jenson, History of Moapa Stake M3. Also, Bleak, op. cit., p. 254.
40 Abbott, op. cit., p. 25.
The years 1882, 1883, 1884, and 1885 were disastrous for floods. Much good cotton producing bottom land was washed away, including seventy-five acres near the head of the St. George-Rio Virgin Field in May of the latter year. The frequency of the floods and the extensive damage they caused led one St. George farmer to write the following in his journals:

How much land was carried away by the summer floods and the high waters of April and May would at this time be difficult to estimate. But it was a considerable part of the available farming land, and of rich quality, too. The river seemed satisfied to have only the best. 41

In the lower Virgin settlements the effect was felt, and was recorded in the settlers diaries. One diary read: "1882 was bad for floods, 1883 was disastrous, 1884 was worse. The troubles begin in March and the melting snows coupled with the spring rains kept the men constantly at work through March, April, and May, and our prime bottom land was stolen by the river". 42 The years 1889 and 1890 were calamitous for floods, also, and much expense and damage to both the cotton and to property was experienced. 43

Problems Resulting from Limited Vegetation

Vegetative cover is important to a locality because of its ability to slow down runoff water and allow it to sink

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41 History of St. George Stake, M3.
42 Myron Abbott, Diary. Entries for those dates. Typed copy of the original in the Washington County Library, St. George, Utah.
into the ground, thereby preventing flash flooding and waste-
ful erosion. At the same time, the underground water table
can be replenished because the water from precipitation can
be absorbed. Otherwise, this water would flow into the near-
est drainage channel and find its way to the river and even-
tually to the sea, without benefiting the local area.

If plant cover is lacking, the runoff water will erode
away the soil which would have been held in place by the root-
lets of plants and grasses. The eroded soil is later deposited
on farmlands or carried away in streams.

The hills in the vicinity of the Virgin are devoid,
for the most part, of any vegetation. This is a disadvantage,
particularly in an arid climate where rainfall often comes in
deluges. Vast amounts of water rushed down through ravines
and onto farmers land. Besides causing crop destruction,
they also dug wide gullies through valuable farmland and on
other occasions, left deposits of sand and debris. There
are innumerable accounts in pioneer records of the damage
to cotton crops from such flash floods.

South and southeast of Bunkerville the country is cut
by many washes which drain into the Virgin. These washes
carry flash floods whenever a thunderstorm of any consequence
occurs. If the country had an adequate cover of vegetation
this trouble would not occur, but little grows except limited
amounts of cactus, yucca, creosote, and other desert plants.
A brief electrical storm during the summer season and water
runs in every gully. Unluckily, the town and the water ditch
lay in the path of these streams, and much damage has resulted from them. One of many such floods struck the town on the night of June 28, 1882. An account from one pioneers record gives an idea of the extensive nature of the storm:

This flood lasted four or five hours, breaking our water ditch and carrying it almost entirely away. It is thought that it will cost the town the loss of the crops, the damage to them being extremely heavy, and the cutting up of the land (which we have labored hard to level)."  

The Effect of Minerals on Cotton Production

Another barrier in the progress toward large scale cotton production was the impregnation of minerals in the soil. In certain sections, when the ground was irrigated, this alkali would come to the surface and form a hard crust, shutting out the warmth of the sunshine and thus preventing the seed from growing. If the seed forced its way through the crust, as it sometimes did, the minerals formed a tight band about the stem which soon burned through and the tender plant died. The farmer then must replant, and labor with the soil in the hope of realizing a harvest.

A study of the effect of minerals in the soil and water on cotton production cannot be treated separately since much of the mineral content of the soil was brought there by

44 Deseret News, 32:72, quoted in History of Moapa Stake.

45 "A View of Dixie-Past, Present and Future," Yepricula, June 1, 1865, p. 9. These minerals were similar in their constituency to saleratus and glauber salts.

46 Barrett, op. cit., p. 138.
water. There are numerous entries in pioneer journals about effects of mineral-laden water and soil on their cotton plants.

In the first year of cotton production at Heberville minerals in the soil were injuring their plants whenever water touched them. This was avoided by hilling up the plants and keeping the water away from the stalks. One careful observer of cotton culture in southern Utah said:

I have observed on land where there is considerable mineral, that when water is applied so that it reaches the stem of the plant its effects are disastrous, but in rows ridged so that the water could soak to the roots without touching the stem, the plant was healthy and strong.

In some places upon the application of water the surface was changed to a cement, caused by a superabundance of lime in the soil. "Our chief enemy, thus far, has been the mineral in the soil which by adoption of modes of culture suited to the soil may to some extent be overcome", writes one pioneer farmer. 47

This same year, 1858, a portion of the cotton planted at Washington was destroyed by alkali and salt in the soil or carried in by water. The following year some of the land there had to be abandoned because of the mineral which came through the soil. Many of the cotton missionaries believed that the sulphur springs up the river about fifteen miles were responsible for the poisonous effect of the water upon the cotton plants. 48

In an early report made under George A. Smith concern-

47 Journal History, July-December, 1858.

48 Documentary History, p. 1039. With time, however, the cotton seeds tended to overcome to some degree, the alkali soil.
ing Washington County, which had been presented to the Legislative Council of the Territory of Utah, it had been pointed out that "the water and much of the land thus planted was found unfit for cotton by the presence of mineral substance in the soil". 49

A large group of Swiss emigrants settled in the Santa Clara area and also had trouble with the soil. Some of the land was impregnated with alkali and this caused the Swiss a great deal of grief. One of them said that they knew nothing of mineral land in the country from which they had come, and consequently, spent much useless toil in leveling and otherwise preparing the ground for cotton, but the seeds refused to grow in such soil and this land had to be abandoned. 50

Cotton culture became more firmly established as time and experience gave the settlers a knowledge of what was necessary to succeed in the venture. They learned that the mineral soil was poor cotton land. 51

In strange contrast to cotton growers on the Virgin, the cotton missionary on the Muddy had no trouble raising cotton in alkali infested ground. In fact, one missionary from St. Thomas remarked that "cotton will grow on land so impregnated with minerals that nothing else will grow on it". 52

49 History of Brigham Young, MS.
52 Deseret News, 15:61, also 118. Letter sent in by Andrew Gibbons.
The probable explanation for cotton doing well on such alkaline soils as were found on the Muddy was that the cotton seeds being used there were of a more resistant type. Cotton seeds can become tolerant of certain minerals. 53

Although for several years some cotton was grown at Toquerville, the yield was never as heavy as the cotton grown further down the river. The reason was the soil. The land at this location was a compact clay and granite mixture which is not suitable for cotton culture. The best soil for cotton, the missionaries found, was a light, sandy loam with considerable amount of vegetable mould. 54

Rough Nature of the Land

Some of the areas of most fertile soil are quite rough and uneven and much time and money was required to level them for agriculture. In Mesquite, the pioneers calculated that it cost from twenty to seventy dollars in labor per acre. This included clearing the mesquite trees and heavy brush with which the region is covered. 55

Problems from Insects and Sickness

Fortunately, Utah cotton was free from the diseases

53 Documentary History, p. 1039.

54 Daniel Bonelli, "Cotton Culture in Southern Utah," Deseret News, April 9, 1868.

and pests that afflict cotton grown elsewhere. No doubt the hot, dry desert climate had much to do with preventing the inrode of such diseases and pests. But damage done by grasshoppers throughout the entire cotton growing period was colossal. Worms also contributed to the loss of crops. The cotton crop for the year 1865 was poor, due mostly to the ravages of grasshoppers which infested the region, causing considerable destruction of all the crops. In the Upper Virgin settlements, worms destroyed many acres of cotton. In some places entire patches were left leafless.

From 1866 to 1870 the cotton crops of Washington, Kane, and Rio Virgin Counties were very light. According to one cotton factory employee: "all these deficiencies are chargeable to the grasshoppers. There is not sufficient cotton raised to supply the mills half the year working ten hours per day".

Cotton crops continued to suffer from grasshoppers in 1868 and 1869. The pest seems to have been quite general at that time in all the settlements on the Virgin. The editor of Cactus writes in March of 1869: "These pests continue to trouble us, and notwithstanding all the efforts of the people who have been energetically fighting them, they have succeeded

56 Journal History, July-Dec. 1858.
58 Historian's Office Letter Book, No. 6, p. 920.
in destroying considerable crops."  

The cotton crops of 1871-1872 were light, largely do
to grasshoppers. 60 In 1871, in Leeds, another farmer wrote:
"The grasshoppers have literally stripped everything we had
here this spring". 61

In Santa Clara hoppers came two years in a row. John
Stucki writes:

The cotton was doing fine. All at once the ground was
shaded . . . It was grasshoppers that darkened the sun.
There were so many that in two days they ate the
crops all up. There was nothing green left in the valley
after the grasshoppers left.

The next year my father planted crops again. The
grasshoppers came again and ate up all our crops and
everybody's crops in about three days. 62

One wonders what kept them going. Some spring seasons found
them without food save the pig-weeds that grew abundantly.
According to one pioneer, these were "cooked in water without
anything more nourishing to go with them, as we had no cow,
no flour, no seasoning of any kind, not even a bit of bread
for the little children". 63 Even on the Muddy, which suf
fered least of all from production problems, grasshoppers did
serious damage. Concerning this, James Bleak wrote: "Condi
tions, after a backward spring, proved favorable and then on

59 Cactus, March 20, 1869.
60 Barrett, op. cit., p. 260.
George Stake, M3.
63 Ibid., pp. 63-64.
August 17, hordes of grasshoppers swarmed into the cotton fields causing serious damage. 64

Unfortunately the cotton missionaries were not as tolerant to diseases as was their cotton. Malaria was widespread during most of the period of cotton production and, at times, entire communities were afflicted. At such times cotton culture also suffered from a reduced labor force. Some settlements had to be evacuated permanently due to continued epidemics.

In 1859 the missionaries both at Washington and Heberville were attacked by chills and fever. Had it not been for the visits of the Apostles who gave encouragement, many would have abandoned the cotton farms. 65 In 1861, also, malaria was plagueing the settlers at Washington. 66 It was mostly in the lowlands of Washington. 67

Settlements on the Lower Virgin also suffered. Malaria broke out among the settlers and as many as nine men at a time were unable to work. 68

In 1859 malaria broke out among the cotton farmers


66 Ibid., p. 66.


68 William E. Abbott, Story of My Life, entries for July 21, 1881; July 1, 1882 and June 8, 1883.
of Heberville and added to the woes of the already overburdened men. That year the place was abandoned, mostly from disease. The labor supply throughout all the cotton settlements was such that if two or three men were rendered incapacitated from either disease or some other reason, the other laborers became overburdened. There never really were enough hands to meet the demands of cotton culture under the non-mechanized system by which cotton was raised.

From Mesquite a report of November 30, 1882 by Bishop Branch indicated that in July of that year twelve men, himself included, were down with chills and fever, leaving but nine men to continue work on the canal. He expressed fear that if help did not come some would leave. The people finally came to believe the cause to be a slough bordering the town lots. It was full of stagnant water, decaying vegetable matter, and waste from the lower lots which drained into it. They did not associate the disease with the mosquitoes which swarmed there; but when the brethren turned out and dug a trench which drained the swamp, Santa Clara became a healthy place. The floods which helped sweep out stagnant pools may have helped also in banishing the disease. John Staheli filled up the slough with earth and transformed it into a good piece of farming land.

69 Bleak, op. cit., p. 47.
70 History of Moapa Stake, M3.
71 Stucki, op. cit., pp. 61-62.
Washington was a favorite breeding ground for the Anophelis mosquito, the creek and the numerous springs creating an ideal environment for these troublesome insects. With mistaken logic the settlers blamed their trouble upon the night air that rose from the swamps. There are numerous references to the presence of the disease, almost from the beginning of the town. From 1859 until many years later malaria took its toll in sick, dispirited people whose sapped energy made them completely unfit for the strenuous life they had to live if they survived. Its effect on cotton production was no doubt enormous. It was probably the greatest trial they had to face, and accounted in no little degree for the many who deserted the ranks. There was so little that could be done for a person once he contracted the disease.\footnote{Bleak, \textit{op. cit.}, p. 47. Quoted in Larson, \textit{op. cit.}, p. 105.}
CHAPTER V

THE INFLUENCE OF THE CULTURAL ENVIRONMENT
ON COTTON CULTURE

The physical environment in the Basin did possess many virtues necessary to cotton culture, but it also had some serious drawbacks to the cultivation of this plant. Irrigation was a necessity since precipitation was inadequate for the growth of crops. Irrigation required the building of dams to raise the water level in the river to a point where it would flow freely onto the land. Irrigation ditches and canals many miles in length needed to be dug to conduct the river water to the locations where it would nourish the farmers' plants. Because of the sandy nature of the terrain, constant toil was demanded of the farmers to keep their ditches in serviceable condition. Costs for this labor ran high since so much labor was required. The lack of building materials for dams, levees and fences posed perennial handicaps to these courageous pioneers. They were further hindered by the lack of adequate farming technology since few in the Basin had raised cotton previously. The dearth of agricultural implements among these farmers further curtailed the growing of this plant.
Dam Building

Of all the problems that beset the growers of cotton and that curtailed its production, the building of dams and the irrigating of their thirsty farmland were the greatest. How could the settlers, with primitive tools and inadequate technology, build a dam that could withstand the ravages of constant floods? With what building materials could they work with permanency? These were questions they were forced to answer or perish in the desert.

To begin with, the channel of the Virgin is sandy except in the highest settlements, and the difficulties of building a dam on a sandy foundation were quickly realized by the cotton missionaries after one or two floods. In Washington the regularity with which the river swept away the dam in its sandy channel made the cost of water for irrigation something to discourage even the stoutest heart.

It was here, in 1857, that the first dam across the Virgin was built, about a mile or so southeast of Washington. It was soon washed out and another one built, but it too was carried away again that same season. In 1858 the dam was twice swept away, and in 1859 it was washed away three times. These misfortunes overtaxed the strength of the few who remained and no doubt cut in half the amount of cotton grown those years. The year 1860 brought no change in the

mood of the river, and the dam was lost several times. Each successive flood made the stream wider and deeper, and harder to control. In Mesquite and Bunkerville the same problem existed. In these settlements, one farmer blamed the stream bed as the cause for the problem in the following manner:

One of the troubles came from the widening stream bed. We had tried for some time to keep the stream dammed entirely across the channel, since the whole stream had to be diverted in time of low water. The bed was sandy and difficult to dam. In July and August came the flood waters and the dam had to be put in again.

Higher up on the river, near the present entrance to Zion National Park, were located the settlements of Springdale and Zion. The problem of a sandy channel was almost non-existent there for much of the bed of the North Fork of the Virgin is rocky, and while subject to floods, the farmers of Springdale and Zion had a solid foundation on which to build.

The St. George farmers learned, after many attempts to control the unruly Virgin, that "dams built between rock-bound shores" were sufficiently strong to prevent the floods from washing them away and that stone bottoms were less likely to be cut away by the currents of the river. Often levees were built to keep the dammed water from spilling around the

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2Ibid., p. 108.

3Thomas Adams, Interview, October 11, 1945. Quoted in Larson, op. cit., p. 244.

4History of Zion Park Stake, MS.

5"A View of Dixie-Past, Present and Future," Yepricula, April 1, 1865, p. 90.
edge of the dam and back into the river again. Once such levee was built at the Heberville dam. It was forty rods long and four or five feet high, near the river bank, but, made of sand, it washed away almost immediately during the next flood. At St. George early in 1862 Brigham Jarvis writes: "Levee banks made by hard toil melted like wax before a fire when the angry flood waters swept by".

Part of the trouble of not being able to build a permanent dam was a chronic lack of building material. The only material available was brush, rock, gravel, and trees. At Washington and St. George the first few seasons the settlers used these items, but according to Wandle Mace, a St. George farmer:

Rock became scarce in the vicinity of the dam and had to be hauled from a distance. When the colonists of 1861 arrived they found the settlers much discouraged and ready to desert the place. Floods had again torn out their dam and they were too few in number to rebuild it.

In Heberville, in February of 1858, the men began to build "a large dam of buck brush and gravel; it is about seventy feet long and from ten to fifteen feet high. . . . Floods carried away the dam just as it was finished".

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7 Brigham Jarvis, Items Pertaining to My Water Rights on the Virgin River, MS.

8 Journal of Wandle Mace, quoted in History of St. George Stake.

9 Joseph Horne, "letter," Ibid.
They went to work and built another. This was soon torn out by high water.

According to Brigham Jarvis, a Washington farmer, the building of a dam took place in the following manner:

Tremendous amounts of brush and rock were used to dam the river, but the turbulent flood waters and the high waters from melting snow on the watersheds above were constantly undermining the dam. 'Wooden horses,' as they were called, were placed in the river as a basis for the dam. These were rather large trees with the branches left on. Holes were bored in their trunks at different points and into these were fitted strong pegs, at right angles to the logs' surface. This arrangement tended to keep the log from being dislodged by the current. These logs were placed in the river with the butts upstream; the pegs elevated them somewhat, and against these supports loads of brush and rocks were placed. This device, however, succumbed to the pounding of the river, even though it did hold somewhat better than the brush and rock dam.  

The story of Bunkerville is like those of the other settlements, a tale of men against the river. In 1877 the first settlers there found little possibility for a permanent dam. Nevertheless, a dam was built, only to be washed out soon after. Since that time scores of rock and brush dams have been put in and washed out. Abandonment was considered many times. The following account by William E. Abbott gives a glimpse of the trials the early settlers of Bunkerville went through:

we got together a number of times in council as to whether we would try again, but we kept on and on, building dams, shoveling sand out of our canals, fixing breaks in our canals. I have worked in the river building dams in water

10Mabel Jarvis, Interview, quoted in Larson, op. cit., p. 167. This information was given her by her father, Brigham Jarvis, 3r.
up to my neck for two or three weeks at a time. We put into our dam at one time 300 loads of brush and 500 loads of rock, and it had to be done so often. No wonder that age creeps over us so early in life. No wonder that so many of our young men have passed over the great divide. 11

Quicksand, common along all of the Middle and Lower Virgin, vexed the settlers continually. Because of this, crossing the river was dangerous at times, even when the water was not high. Often the farmers could not even get to their fields to water the crops because of it. 12

In Washington, about 1874, a rock dam was built across the river. This proved to be quite a task, since the quicksand at the damsite proved to be more than thirty feet deep, and greedily engulfed the many tones of rock placed in the river's bed. Rock for the purpose was secured by blasting away the point of the cliffs which overlooked the river. The rocks were built up from the solid bottom and finally they quit sinking into the sand, and the dam was eventually finished. Some years later a large flood took away the top of the dam. This could have been repaired, but the flood cut away the land on the east side of the structure and extended the sandy channel's width to nearly half a mile. 13

The expense of this constant dam building is difficult to compute because much of it was counted in man hours. A considerable amount of it, however, was paid for in cash by

13 Jarvis, op. cit., quoted in Larson, op. cit., p. 171.
the settlers themselves which posed a great hardship upon them since hard cash was a scarce item everywhere in the Territory, particularly in the isolated settlements of the Virgin Basin.

The dam at Santa Clara, washed out the same week it was finished, cost the farmers $1030.14 How many times the dam at Washington was destroyed by floods is a matter for conjecture. There may have been seasons when the dam held, but such, if they existed, were the exception, certainly not the rule.

An idea of the burden carried by the people of Washington is found in the report made in the year 1865 on expenditures for dams and canals in the Southern Mission. The report, which bears the date of August 29, was compiled at the request of Wilford Woodruff. According to this report, Washington had spent $70,000.00 up to the year 1865, and was at that time engaged in dam and canal building which it was estimated would cost $10,000.00 when completed. No other community had been forced to spend an amount even remotely approaching this figure. Of the $167,421.50 spent in the county between 1857, when Washington was first settled, and 1865, Washington had spent $80,000.00, or nearly half the total.15

In addition to this, the amount of money spent by these farmers for damming the Virgin the many times from the

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15 Ibid., p. 183.
date of those records until the first permanent dam built in 1890-1893, must be left to the imagination. In terms of today's values it ran into the many hundreds of thousands of dollars, for a day's work then was worth but two dollars, and one-third more when working in the water. 16

A device, conceived by Brigham Jarvis, made possible the first permanent dam on the Virgin. This device, called a spillway, controlled with more certainty the excess water which came down the river and took considerable strain off the dam during flooding. Jarvis is credited with the first use of this innovation in the West, since irrigation in the United States was first introduced by the Mormons when they settled Salt Lake Valley. 17

The misery and damage from the floods finally convinced the people of Washington and St. George that unless a permanent dam could be built, they would have to abandon the Washington Field. This decision was brought to a head when, in 1884, the river destroyed the Washington Field Dam, 18 and again in 1885, in August, when the crops were in need of water. 19 It was unanimously agreed that a pile dam should be constructed. 20 The Pine Valley Mountains were explored for suitable

17Larson, op. cit., p. 72.
18History of St. George Stake, M3.
19Records of Washington Field Canal Co., Aug. 29, 1885.
20Loc. cit., and Sept. 12, 1885.
timbers for piles. Timbers were found and skidded down the incline by means of the front wheels of a wagon. Four horses were required to pull the wheels up to the point where the timbers lay. Sixteen dollars per ton were allowed for transportation of the piles to the dam. Plans were made to cast a 900 pound hammer for the pile driver, at Iron County. The hammer was ready in February, 1886. The site chosen for the new dam was two or three hundred yards below the old one.

Work on the dam progressed rather rapidly at first, and on July 12, 1886, the piles were all driven. The following excerpt describes the manner in which the pile dam was built:

The first row of piles was low, almost at the water's level; the others sloped back to a height of about six feet. These piles were cross-tied both ways, so that they gave the effect of squares. These squares were then filled in with rock from the mountains on either side of the river. Rock was loaded on wagons and taken to the dam.

This dam-building was hard, disagreeable work. Much of the time the men had to work in the water up to their waists or armpits, and in the spring months the water in the Virgin is cold, especially during the forenoon. A spillway was still to built. Work on the dam continued through 1887 and 1888. Finally, on December 7, 1889, the dam was finished. There was much rejoicing at the damsite, including some wine drinking. But their joy was short lived. The river began to rise in the largest flood of its history,

21 Ibid., Nov. 21, 1885 and Dec. 22, 1886.
22 Ibid., Nov. 21, 1885 and Feb. 21, 1886.
23 Larson, op. cit., pp. 262-263.
twisting and tearing out the piles and stringers as if they were straws, and tore out the dam.\textsuperscript{24} within two days a motion to build a new dam and to select a new sight had been passed by the City Board "In time to raise a crop the next year".\textsuperscript{25}

This new dam was to be built three or four miles above the Pile Dam on the south side of the river where a high rocky eminence abruptly terminated with the river running against it. The idea was to place a dry dam in the river, and raise the water until it flowed over the rock stratum on the north side. Thus, floods could be controlled and water secured for the canal. This would include a headgate and spillway, iron gates and tunnel.\textsuperscript{26}

The plan was approved February first, 1890,\textsuperscript{27} but due to financial red tape, work was not started until fall. Poverty of the people and an extreme shortage of food curtailed construction, as they could not raise any crops until a dam was built.\textsuperscript{28} Indians and railroad workers, with vital tools and blasting powder, helped with the labor in return for breadstuffs, as labor and equipment were scarce.

The dam was completed in February, 1891, after a season of no crops since it was impossible to get water onto the

\textsuperscript{24} Ibid., p. 263.
\textsuperscript{25} Records of Washington Field Canal Co., Dec. 17, 1889.
\textsuperscript{26} Larson, \textit{op. cit.}, p. 267.
\textsuperscript{27} Records of Washington Field Canal Co., Feb. 1, 1890.
\textsuperscript{28} \textit{loc. cit.}
fields without a dam. But even as they had made the last fill, destruction again threatened as a flood came down and began settling and cracking the structure. But hard work in the nick of time saved the dam. It was reinforced at the ends and filled in at the back.

Irrigation of the Cotton Lands

Once a dam had been built and the water level was raised high enough to let water run out through ditches, irrigation could commence. But the problems connected with irrigation were equal to those of the dams. So much time was expended to keep the ditches in working order and the dams in place, that little time was left to raise food crops, not to mention cotton.

Much valuable land along the Virgin was situated too high above the river to be irrigated. There was also considerable land near the mouth of the Santa Clara River, but due to the intrenched nature of the river channel, getting a stream of water out for irrigation was almost impossible. There was other rich land that could be irrigated only by means of a tunnel. In such cases the river water could be diverted through the tunnel and out onto the land. The cotton missionaries of 1861 were faced with the problem of tunneling. They

55 Larson, op. cit., p. 275.
56 Bleak, op. cit., p. 67.
cut one through a solid rock cliff along the river bed. When completed it was nine-hundred feet long. This near-impossible task was completed by the end of February. But when the water was turned into the ditch it immediately filled with sand. This happened again and again. It was found that the grade of the ditch was not sufficient to carry the heavy sand along with the water. The tunnel was then abandoned.57

The canal built to serve the first permanent dam on the Virgin necessitated the construction of five tunnels, all of which had to be drilled through solid rock. These were completed by April of 1891 but not without great hardship and sacrifice. At this time the water was turned in. The parts that had been made through limestone, gravel, and earth gave little cause for worry; but in those frequent places where the ditch went through the gypsum formation, unending annoyance resulted. The water found miniature cracks in the formation, and as the water soaked into them, the cracks grew larger as the water dissolved the chalky substance. Several of these holes, not very large at the surface, soon depleted the stream. They were examined, and underneath were found to be "big enough for a bear to crawl in". The holes were dug out, filled in with rock, and then dirt was "puddled" in them until the water ran in the ditch again. But they continued to break out in old and new places. Water ran into the east entrance of the tunnel, but none came out of the west end.

57 Jarvis, op. cit., p. 9.
Cotton lint was obtained from the Washington factory, and this was used for plugging, but it too was unsuccessful. The water just melted the rock around the lint and ran off into the underground cavities in the rocks. For four years the trouble persisted, and only 160 acres of the bench were brought into cultivation, and constantly suffered for want of water. It appeared that the $25,000.00 expended on the project had been wasted. 58

After each flood, the canals of all the settlements were choaked with sand and debris that prevented water from flowing in them. In Grafton it was said that "making ditches was like the household washing; it was a weekly occurrence". 59

In all the cotton communities it was found that after each storm the channel of the river had changed, often drastically. Usually the river channel was wider and shallower than it had been before so that water would not flow into the canals and ditches as it had before. In 1862 this situation was aggravated so badly that work on the Virgin Ditch was temporarily abandoned 60 and the farmers went to the Santa Clara fields instead to plant their cotton and crops. 61

The next season the farmers continued to labor on the Virgin Ditch. when completed it was six miles in length, three feet deep and six feet wide. The amount of land under the

59 Deseret News, Feb. 12, 1862.
60 Jarvis, op. cit.
61 Bleak, op. cit., p. 94.
ditch did not compensate for the amount of time and expense involved in its construction. One farmer wrote in his journal concerning the difficulties incurred in irrigating his fields as follows:

Our crops are light, and we have had a great deal of trouble with our Virgin ditch breaking away nearly every day. Thousands of dollars have been expended upon it already.

Another farmer composed a poem expressing the sentiment that he and his fellow workers shared concerning the trials and difficulties they faced in irrigating their land. This poem appeared in the Vepricula, November 1, 1864. It reads:

we are but a few
we own it is true,
Rolled down in the South
And we've never stood still,
Or been down in the mouth.
The old chieftans will,
we've endeavored to fill,
And the desert improve:
By the patience of Job
And no rain from above.

Our life on the stream,
The old Virgin I mean,
Glides swiftly away,
And the old patched up ditch
It refuses to stay.
The water runs down,
The breadstuff has gone:
And the mineral so salt
Rushes up to our view,
And our Virgin crops halt.

Let each in the day
Of prosperity say
I have put up my fence
I have worked on the ditch
And have gained recompense.
Oh that each from th' old Boys
May receive this applause:
well and faithfully done
Enter into the shade
And don't work in the sun.
Costs ran high on canals dug. By 1866 nine miles of canal had been completed at a cost of $11,600, or $15.50 per acre. During the same period of time the cost of water in the St. George-Santa Clara Field was $15.50 per acre; and the Virgin Field was $63.36 per acre. These high expenses continued. The water tax for the year 1867 was $9 per acre. For a number of years after 1867 the tax was $13 per acre. In 1877 another attempt at dam building was made a little less than two miles above the tunnel, at a cost of $4,000. Taxes in 1881 were $8 per acre. The Old Virgin Ditch was abandoned shortly afterward.

It was decided by the St. George farmers, who were planting in three different fields, widely separated, that a survey should be made to determine which field was the most productive. The other fields were then to be abandoned. A committee was set up. The following is part of their report:

The cost annually, per acre, for keeping the Virgin Field ditches in repair is $11.05 per acre.

The cost annually per acre, for keeping the Heberville ditches in repair is $3.25.

The annual cost, per acre for keeping the Clara Field ditches in repair is $1.55.

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63 Bleak, *op. cit.*, Book B, p. 231.


In quality, the Heberville Field, as a whole, is one-eighth better than the Clara Field. But owing to the great distance off, the trouble in crossing the river with loads in high water, and the cost of keeping up the ditches in the early part of the season, — it is recommended that as much of the Clara as can suitably be prepared be sown in wheat.

In quality, one-half of the Virgin Field is considered equal to the Heberville and is one-eighth better than the Clara Field. The remaining half is considered to be not more than one-quarter as good. Leaving the balance in favor of the Clara Field as to its quality as five is to three and one-half compared with the Virgin.

The water in the Clara Field is easily controlled, and, in the forepart of the season, abundant; but it is subject to decrease, almost to nothing in dry seasons. But the showers of July and August have generally been sufficient to mature all crops, that have proper attention during the early part of the season.

The Virgin is usually high in the spring and difficult to control, and it is generally late in the season before the water can be turned into the ditches for irrigation.

The same showers that assist the crops on the Clara bottom frequently bring down heavy floods in the Virgin, washing away our dams and filling up our ditches, causing us much labor and expense to repair, and leaving us without water sometimes for weeks, causing great injury to our crops in this field, as they are not usually so far advanced in their growth; and, the lands being dryer and poorer, cannot withstand the drought so well as the Clara Field.

In view of these considerations we deem the chances for water in the Rio Virgin and the Santa Clara as about equal, with a large margin in favor of the latter in point of expense.

We, therefore, recommend that the Virgin Field below the tunnel, be thrown up for the present, and all our labor concentrated on the Clara Field, which is generally owner by the same persons who own the Virgin Field and can be farmed with much greater profit by us.

The concern the farmers had over the welfare of their crops is reflected in the manner with which every advantage and disadvantage was carefully weighed before making the above decision, as their livelihoods depended upon the success of their crops.

Each settlement had a water master who served twenty-four hours a day watching for breaks or litter in the canal. His job was to see that water would be available to the fields each day. The water master for Bunkerville in the early 1880's was Myron Abbott. His diary is full of repetitious references to the trouble he experienced keeping the ditches in good condition. There is scarcely a day which does not make reference to the ditches. The following is typical:

1884.

May 12. I watch the ditch all day. It broke at the mill in the afternoon, and four of the brethren besides myself fixed it and turned the water down, but the headgate choked and all of the water stopped during the night.

May 13. I went to the head of the ditch three times.

May 14. I went up the ditch twice.

May 15. I went to the head of the ditch twice. There was a flood in the river, and a great amount of driftwood came down the river and choked the gates and stopped the water, and I had to clean it out.

May 16. I watched the ditch ...

May 17. ... A very heavy storm came up from the southeast. I returned home as fast as I could and got home just as it commenced to hail and it was the worst storm we have ever had in this country. It almost ruined our gardens and broke our ditch in fifty-two places and sent large streams of water through our fields, and gullied them, great excitement prevailed with the people.
May 23. I went to the dam after wood... I found that our ditch was about to be washed away. I went to town and called out the hands and went up the river and put in two breakers to keep the water from the bank. Under such conditions it is little wonder that crop damages and losses were so common, and yields per acre so unreliable.

The burrowing of gophers resulted in problems that could have resulted in breaks in ditches and canals if not discovered in time. Beavers persisted in building their dams in the canals and caused considerable trouble. This is attested to by this item from the minutes of April 13, 1878: "on motion ordered that the Board pay $2.50 per head for beavers killed or caught on the Dam or ditches, the scalps to be delivered to the Secretary".

The deposition of sand from the river and canals was one of the biggest stumbling blocks to irrigation in the Basin. This problem was greatly solved by the construction of a sand gate. The gate is placed lower than the ditch bottom, and when raised the water rushes out swiftly, washing the accumulated sand out of the ditch. With these gates spaced at intervals, the sand can be cleaned out of the ditches in a very short time, and the energy once squandered on shoveling out the sand could now be used in more productive labor. These sand gates became a part of every canal of importance on the Virgin; and while they are undoubtedly waste-

67 Myron Abbott, Diary. Entries for those dates.
68 History of Moapa Stake, M3.
69 Records of W. F. C. Co.
ful of water, without them the cost of irrigation would likely be prohibitive. 70

One problem never solved until the use of concrete ditches in this century was the collapse of the earth adjacent to the canal. The water which soaked into the hillside often brought down great slides of rock and earth; and when the ditch broke, gravity soon washed a great gash which had to be filled before the water could be brought back to the crops. 71

Lack of Adequate Farming Technology

Many of the crop failures and extremely low yields were due to a dearth of farming experience, and bad management. 72 It was true that a few of the many selected to go south to plant cotton had lived in the Southern states and were acquainted with cotton culture, but the vast majority knew virtually nothing about cotton culture and many of these were not even acquainted with farming, having come from industrial cities. 73 Pioneer records reveal that:

Many of them had never planted cotton and were entirely unacquainted with the correct manner or proper time of applying the water. Much of the land planted was later

71 Ibid., p. 314.
72 Barrett, op. cit., p. 77.
73 Larson, op. cit., p. 101
found unfit for cotton by the presence of mineral substances in the soil. 74

Not only did the ordinary farmer not know how to irrigate, but even those who had raised cotton in the South had never irrigated since it was not necessary there. They all had to learn by experimenting, and their experiments resulted in failures in many instances.

Probably those with the least farming experience were the twenty Swiss families that were a part of the 1861 group. These poor people had never raised crops before. Many of them had been wine makers and craftsmen in their homeland. They had no farming tools and lacked adequate farming technology and because of this their first few years with cotton proved fruitless. 75

Many of the cotton farmers were not careful in selecting the best seed for planting each season. This practice soon led to poor cotton crops. Some were ignorant of which seeds were best, but others were just careless. 76 But fortunately for the Virgin River farmers, the seed used by them became increasingly tolerant of the climate each season.

George A. Smith discussed the growing tolerance of the seeds at a conference in 1861 as follows:

Robert D. Covington, who was appointed Bishop of this place, has cultivated cotton every year since, and he

74 History of Brigham Young, M3., 1859, p. 759.
75 Journal of John S. Stucki.
76 Bleak, op. cit., Book B, pp. 80-82.
has preserved specimens from each year's crop up to 1860. Every year these staples have improved and the
seed is becoming more natural to the climate and the
improvements thus made appear to give manifest evidence
of success, as well as encouragement for the continuance
of the enterprise.  

Some of the farmers who had never farmed before had
to learn from the Indians and their techniques were not al­
ways the best. Amasa Lyman reported seeing some cotton that
did not look very well because of the rude manner which they
had adopted in their planting. He said these farmers had
adopted the Indian manner of planting which the cotton growers
told him was not a good one.

Tools and Equipment

The farmers needed teams and horses in order to plow
their fields. Unfortunately, many of these farmers either
had no teams or the condition of their work animals was so
poor that very little use came from them. In such cases it
was necessary for those without, to labor for those who had
good teams in return for the privilege of using them on their
own land at brief intervals.

There was a dearth of agricultural tools of any quality
during the first half of the cotton growing period. The
Vepricula indicates that this problem sprang from an abundance

78 History of St. George Stake, M3.
of poor management. The writer of the article did not believe that there were more than half a dozen plows in all of St. George worth using. He had tried to borrow a plow from his neighbors but after searching everywhere, was unable to locate one. He further mentions that there were many who professed to be farmers who had no plows at all! Not just plows, but of other important implements there was also a chronic shortage. He estimates the tools of the community as follows:

We can more easily enumerate the tools owned and used than name those that are indispensable, which our farmers have failed to procure. About one worthless turning plow, out of repair, to every two families, is a fair estimate. One bull-tongue to every thirty families; one shovel plow to every hundred families. There are a few draggs, cultivators and harvestors, but of very trifling character.

The smaller tools, such as hoes, shovels, spades, axes, etc., are more general. Yet much too scarce, and many of them of an inferior quality. 78

Another illustration testifies to the shortage of instruments of measurement. In 1862 the settlers of Virgin City began work on the Upper Town Ditch, as it was known, to alleviate a shortage of culinary and irrigation water. The surveys were managed by Chapman Duncan. But when the water was finally turned on into the ditch the people were heartsick to find that the water would not run. Due to miscalculations the ditch had been dug uphill! Besides costing the residents $1,800, it also left the community without any water. 79 Even years later people still sang:

78 The Vepriquilla, Feb. 1, 1865, p. 74.
79 Bleak, op. cit., p. 129.
Way down South in Pocketville, Where Duncan dug his ditch uphill.

Ibid., p. 129-130.
CHAPTER VI

TRANSPORTATION AND MARKETING

After the Dixie farmers had raised cotton they had to market it since they needed food and commodities which were not always available in their own locality. This task proved to be almost as difficult as raising the staple. One problem involved in getting the finished cotton textiles or the baled cotton to market was the difficulty of transportation. Roads being what they were added considerable expense to shipping, while roads remained poor and inadequate in the southern part of the Territory, in the north, railroads were rapidly advancing across the vast expanses of desert which had before posed a perpetual barrier to movement between East and West. Imports into the Utah Territory were to have a great impact on home-made commodities as the days of isolation drew to a close. But these rugged pioneer farmers who never seemed to know what failure meant, were to meet the changes of the times with practical solutions.

Transportation From the Core Region

Transportation in the territory occupied by the Mormon pioneers was slow and tedious as there were no navigable streams running in the direction of trade and commerce. The
Virgin is not navigable due to the presence of sand bars and a shallow channel. The terrain of most of the territory in the Virgin Basin was rugged and roads were few. Railroads were non-existent until the completion of the trans-continental railroad in 1869. At that time branches and spurs were added to the main line heading north and south for a short distance. Railroads were very slow to penetrate the area of southern Utah. Throughout the entire period of cotton production, equipment and supplies headed for the cotton factory at Washington, traveled south from Salt Lake City or later from Lehi, by team and wagon. As late as 1892 no railroad had been built anywhere near the Virgin Basin. In this year the Nevada Southern Railroad Company considered building its main line through Washington County, but this never materialized.

Travel anywhere within the area of cotton production was a major undertaking. Even the Lower Virgin settlements of Bunkerville, Mesquite, and Littlefield, on the Old Spanish Trail, were no better off transportation wise than the Upper settlements because of the condition of the roads. Bunkerville residents often hauled loads of salt from St. Thomas, at the junction of the Virgin and the Muddy, all the way to the mines at Silver Reef near Leeds, Utah, a distance of 235 miles. The roads were bad all the way. The road was usually the Virgin River bed. The river had to be crossed between thirty and

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2 James G. Bleak, Annals of the Southern Mission, Ms. Book B.
forty times each way and it was a common sight to see the salt wagons stuck in the quicksand. In the spring and during the summer flood season the high water added to the hazards of the journey. The salt freighters had a song they sang as they freighted their salt. It went:

They haul heavy salt over this hard river bed,
They break down their wagons, their teams are half fed,
They mire down their horses, and then they get stuck.
They break up their harness, they have some bad luck.
Hurrah! They're hauling salt yet
And if they stick to it they will come out of debt. 3

During Dixie's heyday the cotton factory at Washington was over 2,000 miles from an Eastern market, 500 miles from a Western market and 230 miles from a railroad. But this did not necessarily mean that shipping was not carried on over great distances. It did mean, however, that transportation costs were almost prohibitive. For example, Jacob Houtz, who operated a cotton mill on Spring Creek north of Springville, in Utah County, freighted in raw cotton all the way from St. Louis. The manufactured products of this mill were actually sold in California, Montana, and Nevada. At one time twenty-two wagons were on the road the year around, going south to California in the winter, and north to Montana in the summer, with cotton yarn and fabrics. 4

Records show that the Saints in Deseret spent $120,000,000 annually on freight charges for the twelve million

4Barrett, op. cit., p. 237.
pounds of imports brought into the Territory. The northern part of Utah nearest Ogden and Salt Lake City had little transportation problem after 1869 with the completion at Promontory Point, Utah, but this benefit was little reflected in the remote settlements of southern Utah.

Transportation Locational Factors

The relatively cheap price of Southern United States cotton was possible only because of favorable location in regards to transportation. The cotton belt has many major rail lines serving it, from all of the important Northern, Eastern, and Mid-Western markets. In the Southwest the Santa Fe Railroad provided cheap transportation for cotton industries developing in Texas, Arizona, Nevada and California, allowing them to compete with Southern cotton.

In Utah, however, from the earliest beginnings of its cotton industry, transportation was a grave problem. But one must bear in mind that it was never the intention of Church leaders or even the cotton farmers of Utah to export cotton outside the Territory. The cotton was only intended for use by the Saints in the Utah Territory, and transporting the cotton from Utah's Dixie to its intended consumers was not a problem of consequence. Problems resulting from the end of isolation in Utah and the penetration of cheap commodities from outside the Territory will be taken up later.

Marketing the Cotton

Had it not been for the War Between the States and
the resulting scarcity of cotton, Utah's industry might never have gotten off to the successful beginning that it did. The years between 1856 and 1860 were difficult years for cotton growers because the price of cotton was low. With the outbreak of the War, thousands of acres of cotton land in the South were left uncultivated as its farmers, slaves and merchants turned to fighting the North. Almost immediately the supply of cotton was reduced and its value began to increase. With the price sky-rocketing, cotton could be produced very uneconomically and yet still yield a handsome return. It was these conditions that sparked Church leaders to call three hundred families as cotton missionaries in 1861 and another two hundred families in 1862. With the conclusion of the war in 1865 and the resultant drop in cotton prices as the Southerners began to raise cotton again, many Utah farmers became discouraged and left. But there was still no way for cheap imports to enter the Territory and home grown cotton still demanded a decent premium.

Growing cotton in Utah was hard work. After the farmers of Dixie had planted, thinned, hoed and picked the cotton, it still had to be ginned. But this was only half the story. They still had to market it, since they couldn’t eat it. This task proved to be as difficult as raising it, particularly before and after the war. In the early years of cotton raising, the missionary needed wheat and other food stuffs not grown plentifully in the cotton country, so he loaded his wagon with cotton and went north into the wheat
growing areas. He was willing to allow the wheat grower dou-
ble the market price in exchange for his cotton, but too often
he found few willing to trade. The farmer or merchant would
offer as an excuse, that he could do nothing with the cotton
after he bought it. This caused many cotton growers to feel
that cotton was of little use to plant, since they could not
find a market for it, and they began planting less and less
cotton and more food crops. One reads in the Church records
how some cotton farmers solved this dilemma such as in the fol-
lowing:

This year, 1859, less cotton was produced at Toquerville
because they had been unable to dispose of the 1858 crop.
More land had been planted to Chinese sugar cane because
the molasses was in great demand in exchange for bread
stuffs.5

The molasses made from the Chinese sugar cane during the first
season at Toquerville was reputedly the best made in the Ter-
ritory of Utah.6 The success in exchanging sugar and molasses
for breadstuffs further caused a reduction in the amount of
cotton grown in 1858 and 1859. But the molasses made from
the Chinese sugar cane proved a godsend since it brought
wheat in to the cotton farmers. The cane grew well, and the
molasses made from it was in great demand in the settlements
of Iron, Beaver, and Millard Counties.7

Strange as it may seem, many of the women of Mormondom

5 Journal History, 1859.
6 Andrew Jenson, History of Zion Park Stake, M3.
7 Bleak, op. cit., Book A, pp. 47-48; also Deseret
News, March 14, 1880.
were reluctant to buy home-grown cotton because they felt that it was inferior to imported cotton. There was some feeling that when one buys imported cotton they are buying something exotic or superior. George A. Smith reprimanded the Saints living in the northern part of the Territory for not supporting the home industry and pointed out that promoting home production of cotton would save thousands of dollars that were pouring into Gentile coffers. The Gentiles were sending East for cotton to fill the needs of the Saints. He said such a practice was suicidal.  

Cotton Exported from the Territory

The cotton growers had to have cash for much needed items such as shoes for themselves, harnesses, stoves, dishes, cooking utensils and farm machinery. For this cash the farmers looked to California markets. Here they found Gentiles eager to make any kind of a bargain even if their own brethren in Utah were not. In 1864, 11,000 pounds of cotton lint were hauled over the Spanish Trail to California, but this still left 16,000 pounds of lint undisposed of. Provisions of all kinds were freighted by mule teams from San Bernardino, or Los Angeles, California, at sixteen cents a pound. Traffic in these commodities was practically all by barter, for cash was seldom if ever in circulation. When word reached Brig-

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ham Young in Salt Lake City that the southern Saints were selling their cotton outside the Territory he was offended and could not believe that they would send cotton outside the Territory and thus enrich outsiders instead of buying their commodities from Mormon manufactures. The President said that "all who may persist in so ruinous a policy as sending away cotton, under present circumstances, will soon learn that they can not prosper in so doing." President Young was so disappointed in the missionaries for doing this that he, himself, offered to buy with cash, all the cotton they could raise. The farmers took him at his word and grew equally as much or more cotton the following year.

At this same time William Godbe, also trying to find a market for Dixie cotton, agreed to buy all the cotton the southern planters would sell him. He had goods coming up over the Spanish Trail from California and arranged to have them exchanged for lint at Washington. This together with the cotton he bought for cash, was sent East, realizing cotton was at that time in great demand there. He actually made a good profit on this cotton.

At this time the machinery used for working the cotton at the Washington mill was modern and in excellent condition. Home-grown cotton and fabrics were as cheap as imported goods.

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11 Bleak, op. cit., pp. 127-128.
12 Barrett, op. cit., p. 225.
13 Salt Lake Herald, Sept. 22, 1870.
Transportation East for Utah cotton was simplified through the fact that the Church was sending teams and wagons there to assist new Saints emigrating to Zion. This reduced the shipping cost on southern grown cotton sent to Eastern markets. The cotton farmers were amazed to hear that their own home-grown cotton was being sent north and freighted across the plains by oxteams and forwarded to New York, where it was sold from $1.40 to $1.90 per pound.\(^1\)

The residents of Utah began to examine the home-grown cotton more carefully when they realized how much in demand it was in the East. When they impartially examined it they were astonished at its quality. For example, in February of 1863, a cotton grower of Dixie brought a load of cotton bales and yarn to the little settlement of Spring Lake Villa in Utah County. The settlers were delightfully surprised. A reporter to the Deseret News said, "It began to make folks open their eyes to know that we were actually being provided with cotton yarn - - home grown and home spun.\(^2\) Not only did the people here gladly exchange their wheat, potatoes, and cash for this cotton and yarn, but cheered the cotton growers of the Rio Virgin.\(^3\)

To guarantee themselves a standard price on cotton, some of the leaders of the mission met in November, 1864, to

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\(^1\) Bleak, \textit{op. cit.}, Book D, p. 309.


\(^3\) Ibid., p. 228.
set a uniform price on cotton. This decision was inspired from an invitation by William H. Hardy, operator of a landing on the Colorado River. He gave them a price list of commodities available from California. The merchants in California were willing to pay $1.25 per pound "in gold or its equivalent", for their cotton.¹⁷

The price of cotton after the War steadily dropped. At the same time more and more Southern cotton was finding its way into the Territory at declining prices. Dixie cotton, however, did not become cheaper. The Washington factory was the largest of its kind west of the Mississippi, but it suffered chronically from isolation. When new machinery was needed, often six months or longer were required before it arrived at Washington. It seemed that there was never enough machinery for the amount of cotton coming into the factory. The buying and freighting of machinery into the Territory was very expensive and greatly offset the profits of the factory, thus keeping the cost of cotton high. Sometimes the shipments of dyes or lubricating oils were delayed and production stopped until they arrived. Months often elapsed before needed articles such as rings, catgut, travelers and rope, all indispensable to operation of the looms and other machinery, arrived. At times, the need for lubricating oils for the machinery was so dire that castor beans were grown just for their oil, the coarsest beans providing oil actually used in the machinery. On one occasion, in ordering a pump to supply cold water to

¹⁷Bleak, op. cit., p. 162.
a six horse boiler, used in the dye house, a half-dozen letters were written to three different concerns in Philadelphia before the pump finally arrived in Salt Lake City on December 20, 1870, nine months after the first letter had been sent. 18

There was never any problem selling the products made in the factory during the sixties and seventies, but the problem was that the buyers usually paid in kind, having no cash. In the case of goods sold to cooperatives, credit was granted. Often the stores failed to remit payments to the factory when cash was sorely needed. One letter from the factory to a creditor reads, "We are very hard up for a little cash to meet some of our liabilities". 19 Another letter to Bishop T. J. Jones of Panaca, was written to "ascertain if you can let us have a little more cash as we have payments in the East to meet immediately". 20 The buying of dye-stuff, purchased on credit from Eastern firms, could often not be paid for within the limit and interest was added to the cost. A $500 check was lost and the California firm refused payment; letters were lost, shipments were delayed or damaged; credit was lost and interest was heavily added to purchases, much of which was attributed to isolation.

The cotton factory, called the Rio Virgin Manufacturing Company, arranged to have all the cooperatives south of Nephi, owing them money, to pay it through the Z. C. M. I. in Salt Lake City, who in turn, would send the money in the

18 Barrett, op. cit., p. 265.
20 Ibid., p. 283.
form of badly needed commodities to the factory. When the cooperatives failed to remit the debts to the Z. C. M. I., shipments of needed materials were delayed. This was followed by time-wasting correspondence.

Cotton Declines in Utah

At a meeting of the Board in 1874, it was reported that during the last six months the factory had been running, only $48.75 had been made over expenses. 21

The completion of the Union Pacific and Central Pacific Railroads through Ogden in 1869 marked the beginning of the end of cotton culture in Utah. If the prices of Utah cotton had been competitive then the extension of the railroad into Utah would have been a blessing to the cotton farmers, but Utah cotton was not competitive in price.

Abandonment of the Muddy Settlements

Another setback came with the collapse of the Muddy settlements the following year. These had been the major suppliers of cotton for the mill in Washington between 1865 and 1870. The difficult life which the Muddy imposed upon its would-be home makers continued to drive the settlers away. The heat made life almost intolerable during the summer months; malaria weakened the already debilitated workers whose strength was sapped by excessive sweating which upset the chemical balance of the body. Flies and insects were perpetual nuisances. 22

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21 Letter Book, April 21, 1874.
22 Larson, op. cit., p. 209.
The roads were very poor between the settlements on the Muddy and Upper settlements. The Virgin River had to be crossed thirty-eight times between St. Thomas and Beaver Dams. Joseph W. Young wrote a letter to the Deseret News concerning the roads connecting the Lower Virgin settlements. He writes: "Crossing the river was always bad and dangerous. Several lives have been lost already by wagons upsetting in the stream, and much property. . . . These bad roads make the 'boys' discouraged, and the complaint grows on them." 24

The final tragedy on the Muddy came in 1870, when the settlers learned that they were no longer in the Territory of Utah, but in the state of Nevada. The Utah Territorial Legislature created the Rio Virgin County out of the western part of Washington County, on February 15, 1869. Up until this time the Muddy farmers had paid their taxes to Washington County. The taxes were not high in the new county, and since they could be paid in kind, the tax was not burdensome. When Congress took one full degree of territory from western Utah and Arizona, the Muddy settlements and the new towns west of St. George (Panaca, Eggleville, etc.) were thereby placed in Nevada without their consent, and the taxes in Nevada were about five times the amount they had been paying. Furthermore, the state of Nevada demanded payment in gold at the rate of three percent, with a poll tax of four dollars also in gold. The peo-

ple of the Muddy simply did not have the gold to pay these taxes. There were three possible solutions: First, they might try to get Congress to place the boundary where it had formerly been; second, they might try to get a new county created which did not require payment in gold; and third, they could leave the county.  

A petition was sent to the Governor and the Legislative Assembly of the state of Nevada. They explained why they had refused to pay taxes in Lincoln County. The petition said in part:

> We wish your honorable body to consider our conditions. We are an agricultural, not a mining people; and we have had to contend with great difficulties in trying to subdue these alkaline deserts, having expended at least fifty thousand dollars in labor on water sects alone.

> We have been compelled also to feed an Indian population outnumbering our own and that too, without the aid of a single dollar from the government.

> We therefore, respectfully ask your honorable body to abate all taxes assessed against us by the authorities of Lincoln County.  

A petition was also sent to the Congress of the United States. It read similar in tone. Both were denied. The Muddy was abandoned February 1, 1871.

These years were crucial ones for the cotton mission. To help consolidate the efforts and strengthen unity of purpose among the cotton growers in this crisis, President Young established among the Saints in St. George, on Sunday, January 11, 1874, the United Order. George A. Smith described its impor-

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During the war between the North and the South when cotton was scarce; great quantities of cotton yarn were sent to the various settlements of the Territory and proved to be an inestimable blessing. And considerable quantities of cotton were exported from the Territory to the United States. So far the settlement of this southern country had been a success. It was desirable that still better results should be secured; and this might be done by entering into the United Order in the concentration of our labor and means.27

Cotton under the United Order struggled against the ever mounting odds. The factory at Washington did supply many cooperative mercantile establishments throughout the Territory during the 1870's. The Z. C. M. I. in Salt Lake City took the greatest share of goods. The small cooperatives were located in Ephraim, Cedar City, Parowan, Panguitch and as far north as Nephi. There were also many other businesses that took cotton goods for work they had done for the Rio Virgin Manufacturing Company.

The influx of cheap manufactured textiles from the East, and low priced cotton lint from the South into the Territory continued to mount, but the cotton farmers were determined not to succumb. In St. George, factory goods sold well, especially when the people did not know the cloth and yarn was home made. It seemed that people all through the Territory held the notion that imported goods were superior.

New markets were constantly being searched out by the Rio Virgin Company. Salesmen were called and sent out in order to secure trade in other communities. These salesmen often had many thousands of dollars worth of goods. They

27Bleak, op. cit., Book A, p. 313.
were to visit the coop stores in neighboring settlements, allowing a fifteen per cent discount on retail prices payable within sixty days. If cash were paid by the institutions, a seventeen percent discount was allowed. The salesmen were also allowed to sell directly to the consumers if wholesalers were unwilling to purchase. It was also permissible to sell goods for foodstuffs since the factory at Washington paid employees in kind and had a demand for such.

Bunkerville was a very important contributor of cotton to the mill in Washington during the seventies, as were Mesquite and particularly the Muddy settlements.

Times were growing worse as isolation in the Territory was becoming a thing of the past. Mesquite folded in mid-1883, and all her farmers left. Yet, just across the river, Bunkerville continued to hold on fairly well. Both communities lived under identical circumstances. The land, water, climate and distance from civilized centers were practically the same. The consensus seems to be that the United Order was what enabled Bunkerville to hang on, and few will argue that the United Order kept cotton alive in Utah far longer than it would have been without this institution.

Closing of the Factory

Times had grown so bad for cotton during the mid-eighties that the Rio Virgin Manufacturing Company closed down in 1886. There was not enough cotton being produced to keep the mill in operation. This was due to crop failures, low yields, and abandonment of prime cotton settlements.
In addition, intervening opportunities from mining camps and new lands in California seemed to offer more promise to some, and these left the Territory. The market for home-produced textiles was very poor by this time due to imported goods which had now become cheaper than home-produced ones.  

When the factory closed down there was no market for the farmer's cotton and most farmers stopped growing it. This would have been the end of cotton in Utah if the Church had not stepped in. In 1887 the Church tried to put the factory back in operation. President John Taylor, Trustee and Trust, sent the defunct cooperative a certificate for $60,690.85. The cooperatives did not wish to continue operation as a company so, in 1888, the capital stock of the cooperative was transferred to the St. George Temple Association.

Revival of Cotton Growing

The Rio Virgin Company had still not reopened by 1890, four years after it had closed. In April of this year the factory was leased to Thomas Judd. For the first time since the factory's beginning it began to pay dividends. In less than six months after Judd had assumed control, a dividend of four per cent was declared. This caused a revival of cotton growing during the early nineties. Judd was shrewd and energetic and sought out new markets. Newspapers

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28 The Salt Lake Herald, March 1, 1891, p. 3.
in the Church headquarters predicted that more cotton would be
grown in the next few years than had been grown in the many
years previous. The Salt Lake Herald for March 1, 1891 reads:

Cotton of the finest quality, far superior in fiber to
that of the Southern states is yielding to the planter
at the rate of 600 pounds per acre, with three pickings
a year. This product makes a profitable crop where there
are children or cheap help in picking, which is the great-
est part in raising cotton. The past three or four years
little cotton was raised, because there was not a market
for it; but now that the Rio Virgin Mill is running there
will be much more raised.

Judd employed between sixty-five and seventy-five
persons, and operated very efficiently. He pushed produc-
tion, and managed to lower the price of goods. He found mar-
kets and exchanged cotton for flour, molasses, butter, meats,
and a little cash. After having been in operation only a
year, a dividend of six and one-half per cent was declared. Probably at no other good time was the factory run so efficiently
and kept in such good repair.

In 1892 a mass meeting was held in St. George at which
the Nevada Southern Railroad Company was invited to run their
main line through Washington County. The company had been
seriously considering this undertaking. This would have been
beneficial to the growers as it would lower considerably the
transportation charges on exporting cotton out of the Territ-
tory. This effort failed, however.

31 Barrett, op. cit., p. 278.
32 Ibid., pp. 278-279
33 Bleak, Annals, Book C, 1892.
End of Cotton in Dixie

when the efforts of the farmers failed to bring in any railroads into their country all knew that lack of adequate transportation would sooner or later bring an end to cotton in Dixie. In addition, there was too much labor connected with it for the profits received.

There were also other reasons. The Church had been steadily losing interest in her far-flung southern settlements. This was due to the failure of the Mormon Corridor idea, whereby migration and trade would be routed via the Colorado River and the Old Spanish Trail, into Utah. This plan was wholly shattered with the culmination of the link of the Union and Central Pacific Railroads into Utah, thereby rerouting trade and commerce in that direction. In addition, the failure of the conversion of the Indians into the Church, as had been hoped for, furthered lack of interest in this direction. Then, too, the financial position of the Church during the late 1890's had been crippled through confiscation and disfranchisement of its holdings by the Federal Government due to polygamy.

Meanwhile, the operation of the factory under Judd slowly declined in the face of increasing imports of cheap, mass produced Eastern goods. These imports were finding their way to the Utah consumer progressively easier as roads and rail lines penetrated deeper into the Territory.

Cotton continued to be grown and processed at the factory on an ever declining basis until 1910 when Charles W. Nibley, Presiding Bishop of the Church, advised the sel-
ling of the machinery and the closing of the factory. With the closing of the factory, cotton raising, which had waned for the past four or five years, likewise ceased. Some cotton missionaries were cultivating small patches of cotton in their gardens as late as 1912. They said they had never been released from their missions, and until that time, they would continue to grow cotton. 33

Despite the innumerable problems experienced by the factory, and its subsequent failure, its contribution to the people in Dixie was great and proved to be a blessing to them. Cotton here was begun to help promote the establishment of an independent commonwealth. This it did. The factory provided a market for the Saints' raw materials, and in return, supplied them with clothing and textiles that they would not otherwise have had. It also furnished employment for many.

New Crops Take the Place of Cotton

In 1901, Armand Hof attempted to establish a silk industry at Washington. Since many mulberry trees had been planted prior to that time, he felt the undertaking had promise, especially since many farmers pledged their support in providing the raw material. After two years Hof could see that neither he nor the Washington County Silk Company were profiting from the venture. In 1903, he secured the use of the cotton machinery at the Washington factory and began pro-

33Barrett, op. cit., p. 169.
producing both silk and cotton thread, cloth and batting. Unfortunately this also failed to produce profit and was abandoned.

As cotton declined in acreage it was replaced by other crops. Crop census reports from 1880 to 1900 show that hay (alfalfa) and grains were most commonly grown in place of cotton. But after the turn of the century, grain production began to wane in favor of fruits and vegetables which began to experience widespread cultivation. Hay also increased considerably in acreage (see table following page).

The number of acres sown in wheat between 1899 and 1919 gradually decreased, while bushels per acre increased. The reason for this is probably the use of improved farming methods. It will be noted from table that barley and oats declined more rapidly than wheat acreage, and though yields per acre improved, they could not keep pace with decreasing acreage. Grains were not as profitable to sell in Salt Lake City and other northerly markets since they could be grown close by. These, therefore, gave way to fruit crops which were in great demand in northern communities since their own fruit was not ready until later in the season.

Hay and feed production during this time was increasing to meet the demands of the growing home livestock and poultry industry. These activities, together with increased fruit production, are directly traceable to improvement in transportation between the Virgin communities and large centers of population.
TABLE 10

SUMMARY OF UNITED STATES
CENSUS DATA

AGRICULTURE IN WASHINGTON COUNTY

<table>
<thead>
<tr>
<th>YEAR</th>
<th>WHEAT ACRES</th>
<th>WHEAT BUSHELS</th>
<th>BARLEY ACRES</th>
<th>BARLEY BUSHELS</th>
<th>OATS ACRES</th>
<th>OATS BUSHELS</th>
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</thead>
<tbody>
<tr>
<td>1899</td>
<td>1,212</td>
<td>28,461</td>
<td>288</td>
<td>8,764</td>
<td>538</td>
<td>10,623</td>
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<tr>
<td>1909</td>
<td>1,595</td>
<td>33,450</td>
<td>273</td>
<td>8,285</td>
<td>324</td>
<td>8,478</td>
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<tr>
<td>1919</td>
<td>2,854</td>
<td>43,842</td>
<td>242</td>
<td>6,833</td>
<td>166</td>
<td>5,612</td>
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</table>

<table>
<thead>
<tr>
<th>YEAR</th>
<th>HAY &amp; FORAGE ACRES</th>
<th>HAY &amp; FORAGE TONS</th>
<th>CORN ACRES</th>
<th>CORN ACRES</th>
<th>CORN TONS</th>
<th>VALUE OF CROPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1899</td>
<td>2,158</td>
<td>7,673</td>
<td>244</td>
<td>47</td>
<td>12,249</td>
<td>$88</td>
</tr>
<tr>
<td>1909</td>
<td>4,220</td>
<td>14,563</td>
<td>592</td>
<td>7</td>
<td>1,800</td>
<td>$226</td>
</tr>
<tr>
<td>1919</td>
<td>9,111</td>
<td>27,509</td>
<td>1,660</td>
<td>-</td>
<td>-</td>
<td>$1,201</td>
</tr>
</tbody>
</table>

*Economic Activity and Resources of Utah: Utah State Planning Board, By Counties (Salt Lake City: Government Printing, 1941), For Washington County.*
TABLE 11

SUMMARY OF UNITED STATES CENSUS DATA

FRUITS HARVESTED
(Washington County)

<table>
<thead>
<tr>
<th>Crops Harvested</th>
<th>STRAWBERRIES</th>
<th>RASPBERRIES</th>
<th>APPLES</th>
<th>CHERRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACRES</td>
<td>QUARTS</td>
<td>ACRES</td>
<td>QUARTS</td>
</tr>
<tr>
<td>YEAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1899</td>
<td>$\frac{1}{3}$</td>
<td>493</td>
<td>-</td>
<td>43</td>
</tr>
<tr>
<td>1909</td>
<td>1</td>
<td>980</td>
<td>-</td>
<td>140</td>
</tr>
<tr>
<td>1919</td>
<td>2</td>
<td>3,502</td>
<td>2</td>
<td>1,610</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crops Harvested</th>
<th>PEACHES</th>
<th>CURRENTS</th>
<th>Pears</th>
<th>APRICOT</th>
<th>PRUNES PLUMS</th>
<th>GRAPES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BUSHELS</td>
<td>QUARTS</td>
<td>BUSHELS</td>
<td>BUSHELS</td>
<td>BUSHELS</td>
<td>POUNDS</td>
</tr>
<tr>
<td>YEAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1899</td>
<td>4,486</td>
<td>322</td>
<td>420</td>
<td>-</td>
<td>605</td>
<td>-</td>
</tr>
<tr>
<td>1909</td>
<td>13,214</td>
<td>1,248</td>
<td>914</td>
<td>3,015</td>
<td>1,221</td>
<td>985,400</td>
</tr>
<tr>
<td>1919</td>
<td>57,790</td>
<td>4,885</td>
<td>3,403</td>
<td>-</td>
<td>2,818</td>
<td>552,552</td>
</tr>
</tbody>
</table>

*Economic Activity and Resources of Utah: Utah State Planning Board, By Counties (Salt Lake City: Government Printing, 1941), For Washington County.*
Crop census figures for the twenty years after the closing of the Washington factory show the concentration on stock feed and fruit cultivation. Most types of fruits show a three hundred to six hundred per cent increase during this period. Cash value per acre from 1899 to 1909 showed almost three hundred per cent increase while the period 1909-1919 experienced nearly six hundred per cent. One reason for this was the construction of permanent concrete dams at St. George, Washington, Hurricane and La Verkin which reduced the hazards of low yields and crop failures caused from drought. The cementing of ditches and trouble spots cut down on water loss from seepage and ditch breaks.

Around Hurricane, La Verkin, Toquerville and Leeds in particular, fruit growing fast assumed the aspects of a major industry. Most important among the fruits grown were Elberta and other peaches, cherries, pears, apricots, apples, grapes, and strawberries. Of these the Elberta peach was and is the most widely grown. This fruit was sent to many parts of the United States by the Washington County Fruit Growers Cooperative Association.

Shortly after the decline of cotton, the Utah-Idaho Sugar Company became interested in Utah's Dixie as a potential for growing sugar beet seed, which, they hoped, would mature quickly in its warm climate. They were successful with their endeavor and shortly thereafter, sugar beet seeds were being grown in many Virgin settlements. Onion and carrot seed production followed later.
A. Cultivated fields near Leeds, on Leeds clay loam, best for alfalfa, small grains, and sugar-beet seed, which all yield well in normal years. Note basaltic ridge of rough stony land in the background.

B. Moffat fine sandy loam, silted phase, near Bloomington, well adapted to the growing of alfalfa, grapes, and especially peaches.

Washington and St. George developed into large quantity growers of first class carrots, radishes, table beets, and bunch onions. These were shipped to Salt Lake City where they were distributed by wholesalers to many parts of the West.\textsuperscript{34}

In the 1890's, the Muddy communities that had been deserted, were reoccupied. Some of the former cotton farmers resettled here and began planting tomatoes, taking advantage of the warm climate and long growing season. Now, millions of tomato plants are grown on the Muddy Valley farms of Overton, Logandale and Moapa each year. They are shipped all over the United States. The proximity of these settlements to the Las Vegas market has given rise to a thriving dairy industry.

SUMMARY

Climate and Production

In this study the climate and physiography of the areas of cotton production in the Virgin River Basin have been examined in respect to the growing of cotton. Though the region was found to be arid, it still possessed some of the virtues necessary to the production of cotton. The temperature, for one, fits rather well with the demands of cotton culture. Though much of the soil was unfit for cotton due to the presence of minerals, still other large areas of land proved highly satisfactory. The drawbacks of this arid climate, however, worked continually against the cotton grower. Precipitation was irregular, causing either floods or drought. When precipitation occurred it often came in such quantity that it could not be effectively utilized for agriculture. This was partly due to the presence of large areas of bare rock in the head waters of Zion's National Park, and to a lack of vegetation on the surrounding hills. Water was not retained by the ground, but flowed off into streams and out of the area, causing the problems associated with erosion and deposition.

The most serious drawback was the shortage of water which occurred during periods of drought. During such times the level of the streams and rivers steadily dropped until
it could not be utilized by canals and ditches. At the same time, the water became brackish with sulphurs and salts, creating a culinary problem as well. In the face of such water shortages alone, large scale, reliable cotton culture would have been difficult if not impossible.

Such conditions constantly interrupted the supply of cotton for marketing as well as creating economic uncertainty for the farmer. Further, the lack of a reliable supply of the product caused wide price fluctuation. Settlement abandonment of cotton growing areas intensified this condition, culminating in the evacuation of the Muddy settlements.

Labor Supply

The health and energy of the farmers was constantly being sapped by chronic food shortages along with cotton failures. Chills and fever were widespread throughout all the cotton settlements. These, coupled with the hard conditions of living, particularly in the Lower communities, caused many to seriously consider other pursuits that appeared more rewarding. Of these probably the fertile California farms and the jingle of gold and silver from Pioche and other mining camps were the most alluring, and can be credited in no small degree for drawing away many of the less faithful. This dealt the cotton mission a severe blow since at no time were there enough laborers to meet the work load imposed by cotton culture. Finally, other things came along that were more profitable, and cotton was replaced by alfalfa and fruit production.

In a white labor society as Dixie, constant mainten-
ance of dams, ditches and canals as well as cultivating and picking the cotton, pulled the price of cotton too high to be competitive. The rewards from cotton did not compensate for the energy expended.

Market

Cotton culture was undertaken in Utah only to supply the residents of the Territory of Utah and not to be exported, according to Church leadership, but early overproduction caused Mormon cotton farmers to look elsewhere for markets. About this time a crucial cotton shortage was triggered by the outbreak of the Civil War. The price for cotton trebled throughout the United States. Dixie farmers found a welcome market for their cotton most anywhere they could freight it. Hundreds of additional families were sent south to swell Utah's cotton output. Cotton could be produced very inefficiently and still net a good return during this cotton famine. This period was also a time when many Saints were emigrating to Utah and these persons intensified the demand for cotton. The price of cotton was remaining high and demand for it was strong. Then the Civil War ended and cotton production in the South was resumed. The price for cotton once again dropped and the demand for Utah cotton declined. It could no longer be freighted out to other market centers because by the time shipping charges were added it was not competitive. Southern states cotton could be shipped to these markets cheaper than Utah cotton could be. The total cotton acreage in Utah was minute when compared with that of the cotton states. Even
the largest Utah cotton farms were many times smaller than the average sized Southern farms. For this reason alone Southern cotton could be produced more economically.

The trans-continental railroad reached Utah four years after the War was over and made possible cheap transportation in and out of the Territory. Instability of Utah cotton production coupled with the remoteness of its location kept its price high. Even if it could be shipped out via the new railroad, Southern cotton was still produced cheaper, besides being closer to major market centers. To complicate matters, the irresistible specialization wrought by the Industrial Revolution made lint cotton and cotton textiles more plentiful. The influx of these cheap Eastern goods into the Territory continued to mount. Utahn's held the notion that these imports were superior to homemade goods and bought them in preference to home-produced textiles. This, combined with an increase of money into the Territory from Gentile encroachments, further hurt Utah's cotton growers, because this influence was much slower to be felt in remote southern Utah.

Transportation and Distances

Isolation, which had protected home grown cotton, was now drawing to a close with the penetration of rail lines and roads. But these improvements were concentrated in and around the Church headquarters and not in southern Utah, where poor roads continued to pose barriers to transportation.

Conclusion

Diversity of economy was necessary in an isolated society such as the State of Deseret was during its early
days. The Mormons' policy of self-sufficiency in providing clothing, food, and other important commodities had been based on isolation. Utah's cotton industry had been initiated at a time when obtaining cotton elsewhere was prohibitive due to high transportation costs on imported materials. Because of Utah's remote location, transportation improvements taking place in the East were slower to be felt. The South, on the other hand, benefited early from railroad connections to major Eastern markets, and specialization of industry developed rapidly there. Its cotton industry felt the progress made in farming technology at an earlier date than Utah's industry, and developed efficient, large scale cotton culture. The South had a large labor pool to draw from, unlike the newly settled lands of southern Utah. The climate of the Southern cotton belt was more reliable and suited to cotton growth than was that of Utah. It was little wonder that when Utah was connected by rail with the South that its own cotton industry would feel the effects of the specialization of the Southern cotton industry.

The establishment of a cotton mill in Utah's Dixie had been an absolute necessity since baled cotton was not practical to ship out. But as distances were being shortened between East and west through better transportation, the significance of Utah cotton was also changing. It had become a relic industry. It had been initiated during a time of acute isolation. It did not have to be competitive since it was intended only as a source of raw material within the Territory.
When isolation was ended and other sources of this staple were available at low cost the home industry was doomed. Its life, however, was prolonged by the establishment of the United Order in Utah in the 1870's and 1880's, and by the undying religious faith of those called on cotton missions. The attitude of the farmers was not conducive to give up even when failure threatened since they had been called to labor by their Church.

The driving of the golden spike at Promontory Point, which linked the Atlantic with the Pacific was undoubtedly the beginning of the end for Mormon cotton. It was only a question of time until the effects brought about from this link to the outside world would kill cotton in the Territory.

In retrospect, the cotton mission did fulfill its purpose. It did help to establish an independent people. It created a market for home grown staples, and the making of cotton textiles supplied jobs and raised the standard of living for many. Few industries have fought as valiantly for survival as did Utah's cotton industry.
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ABSTRACT
At one time the cotton industry in Utah was a flourishing activity. Many pioneer farmers were engaged in the growing of this staple for the purpose of providing much needed cotton for the Territory of Utah before the days of railroads and highways. After the favorable climatic conditions for agriculture in Utah's Dixie were discovered, leaders of the Latter-day Saint Church made plans for the growing of many fruits and vegetables of the temperate zone. Of these, cotton received by far the most attention, as a domestic source of this raw material was at one time vital to the well being of the Territory of Utah. Hundreds of pioneer families were sent to this southerly location below the rim of the Great Basin to swell Utah's production of this commodity.

For fifty-four years, from 1856 to 1910, cotton was cultivated in the fertile bottom lands of the Virgin River Basin. However, the problems in raising this crop were many. The climate of the Virgin Basin was warm, possessing a long growing season, the soils were rich, and there was water for irrigation, but the region was arid. Many of the drawbacks of desert agriculture were ever-present and posed a constant challenge to those engaged in agriculture.

The labor demands of cotton are high and require a substantial number of field workers. For the Southern states this posed no problem since slave labor had been imported and later, mechanization in farming was introduced. But in the remote sections of southern Utah, which had only recently been colonized, the supply of farm labor was very inadequate.
Such a deficiency of labor placed a heavy burden on the few that undertook cotton culture.

The outbreak of the Civil war created a shortage of cotton fiber as the South turned its attention to fighting the North. The price of cotton jumped almost over night and a demand for cotton from any source was created. Under such conditions the Utah cotton grower was able to produce his crop at great expense, yet still sell it at a profit. But the war soon ended and cheap cotton was again available and the price dropped accordingly. Four years afterward, the trans-continental railroad reached Utah and connected it with the outside world. Consequently, inexpensive, mass produced goods from the East began penetrating the Territory of Utah at an increasing rate. The residents of Utah purchased these cheap textiles in preference to those that were home-produced, and the effect of this practice was ruinous to Utah cotton production.

Though the cotton factory in the Virgin River Basin was for many years the largest west of the Mississippi, it could not compete against cotton and textiles produced to the East of the Mississippi. In the nineties and the early years of this century cotton in Utah declined and died. The farmers in the Virgin Basin turned to other more lucrative pursuits, and in time developed a thriving fruit and vegetable industry.