

# A Survey of <sup>1585</sup> American Honey

## 5. Effect of Area of Production on Composition

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series of ten articles on  
different honeys of America.

**I**N THE FIRST FOUR articles in this series we have discussed the need for new information about the composition of honey and presented a new table of average composition of honey. It has been shown that the same sugars are always found in honey, at least among the monosaccharides and disaccharides, no matter what type it is or where it is produced. It has also been noted that from one year to another, some variation, particularly in granulating tendency, dextrose and moisture content, may be expected.

Another of the many factors that might influence the composition of honey is the area of production. How much difference can we expect between honey of the same floral type grown in different locations, either relatively close together or widely separated? In this instance a number of factors may have an influence, with the final honey composition reflecting the interplay of differences in soils, rainfall, sunshine and other weather factors, different varieties of plants, different farming practices, different minor or competing floral sources, and so on.

Several comparisons of samples may be made to get some information on this point. With our honey samples from 176 floral types and blends of known composition, from 47 of the 50 states, we can make several types of comparisons to clarify these effects.

### Valley and High-altitude Alfalfa Honey Compared

It is well known that Imperial Valley alfalfa honey is different from intermountain alfalfa honey in color and flavor, being darker and of more pronounced flavor. Beyond that, little is known of other differences that might exist between these two types of alfalfa honey. In Table 1 we find such a comparison. The four valley alfalfa samples which were averaged were from Southern California; the eight intermountain samples originated in Wyoming, Utah, Montana, Idaho and Colorado.

In addition to the flavor and color differences already known, it appears that the valley alfalfa is slightly lower in levulose and slightly higher in dextrose. It also seems to be more prone to granulate. The ash content of the valley alfalfa honey is over twice as high as the intermountain honey. It shows considerably greater content of lactone and acid, but their ratio does not differ from that of the high-altitude alfalfa honey, and the pH value is the same. Otherwise the two types of honey are similar.

When these figures were examined with the aid of statistical procedures, it

1/ This is one in a series of articles describing a large-scale study of the composition of honeys from over the United States. Complete data interpretation and conclusions will appear in a forthcoming Department of Agriculture publication.

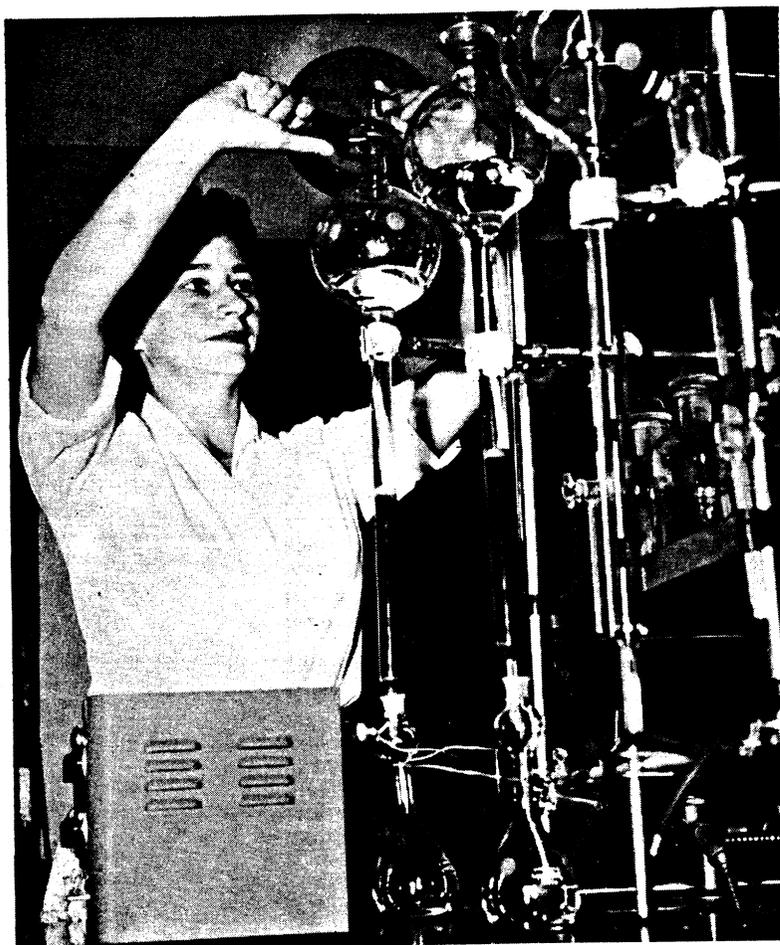
was found that none of the differences in Table 1 (except granulating tendency) are statistically significant. Thus

we found no real difference in composition between alfalfa honey produced in these two areas.

**Table 1. Average Composition of Alfalfa Honey from Different Areas**

Color	Intermountain Light half Extra White ¼-½" layer	Imperial Valley Dark half Extra Light Amber Complete
Granulating tendency	16.4	15.8
Moisture (%)	8	16
Age at anal. (mo.)	39.55	37.88
Levulose (%)	33.28	34.11
Dextrose (%)	2.42	2.88
Sucrose (%)	5.85	5.85
Maltose (%)	0.80	0.83
Higher sugars (%)	1.7	2.6
Unanalyzed (%)	3.83	3.84
pH	15.18	22.55
Free Acid (meq./kg.)	6.42	9.98
Lactone (meq./kg.)	21.60	32.53
Total Acidity (meq./kg.)	0.423	0.442
Lactone-Free Acid Ratio	0.059	0.158
Ash (%)	0.026	0.032
Nitrogen (%)		

The first step in the analysis of honey sugars is shown by Irene Kushnir, passing them through a charcoal column.—USDA photo by M. C. Audsley.



### Cotton Honey from Three States

Cotton honey is characteristically rapidly-granulating and hence differs from many other honey types. In Table 2 is shown a comparison of the averages of two samples from Texas, four from Arizona, and three from California. These averages are remarkably similar. No striking differences in composition are apparent. The California average is slightly higher in sucrose,

definitely of lower pH (higher active acidity), somewhat higher in lactone/acid ratio, and somewhat lower in ash. The Arizona average is definitely lower in nitrogen content, being but half of the other two. None of these differences should have any perceptible effect on the uses of the honey.

### Eastern and Western Orange Honey

A third comparison of this sort is between California orange honey (three samples) and Florida orange (orange-

Table 2. Average Composition of Cotton Honey from Different Areas

Color	Texas Dark half of White Complete soft	Arizona Dark half of White Complete soft	California Light half of White Complete soft
Granulating tendency			
Moisture (%)	15.6	16.3	16.1
Age at analysis (mo.)	9	7	15
Levulose (%)	39.42	39.08	39.77
Dextrose (%)	37.21	37.35	36.18
Sucrose (%)	0.80	1.17	1.52
Maltose (%)	5.02	4.55	4.85
Higher Sugars (%)	0.42	0.57	0.46
Undetermined	1.5	1.2	0.9
pH	4.42	4.39	4.12
Free acidity (meq./kg.)	26.23	23.07	25.29
Lactone (meq./kg.)	5.08	3.85	7.09
Total acidity (meq./kg.)	31.31	26.92	32.38
Lactone/Free acid	0.194	0.166	0.280
Ash (%)	0.339	0.406	0.258
Nitrogen (%)	0.047	0.024	0.047

Table 3. Average Composition of Orange Honey from Two Areas

Color	California Light half of White ½" layer	Florida Dark half of White ¼ of depth
Granulating tendency		
Moisture (%)	16.7	16.6
Levulose (%)	39.26	38.70
Dextrose (%)	31.83	31.82
Sucrose (%)	1.87	2.00
Maltose (%)	6.50	7.70
Higher sugars (%)	1.33	1.51
Undetermined (%)	2.5	1.3
pH	3.67	3.89
Free acidity (meq./kg.)	24.23	21.27
Lactone (meq./kg.)	13.12	7.28
Total Acidity (meq./kg.)	37.35	28.55
Lactone/Free acid	0.540	0.352
Ash (%)	0.082	0.067
Nitrogen (%)	0.030	0.009

grapefruit, three samples) honey. The data are given in Table 3. These values are quite similar, with the California honey showing more acid, lactone and a higher lactone/acid ratio. The Florida average is unusually low in nitrogen. These last three differences are statistically significant. Otherwise, from an analytical point of view, there is very little or no difference between this type of honey, from Florida or California.

#### Comparison of Pairs of Samples of Honey

We may also compare individual samples of the same floral type from different areas. If this is done, considerable differences show up, reflecting the contributions of some of the factors mentioned earlier. In such a comparison of five pairs of samples,

three had similar analyses, while two pairs showed considerable differences, particularly in dextrose and levulose and acidity.

In order, then, to find any general effects of location of production on the composition of honey, such comparisons should be made on considerable numbers of samples from each area, rather than single samples. When this is done with a limited number of samples we have seen that highland and valley alfalfa are quite similar in composition though differing in color and flavor; cotton honey from three states is quite similar; and orange honey from California is very similar in composition to that from Florida.

(Next month:—Relation of granulating tendency to composition.)

Many of the sugar analyses were done with the automatic titrator; Mary Subers records a value in the notebook.—USDA photo by M. C. Audsley.

