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THE TWO-QUEEN HIVE AND
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THE TWO-QUEEN HIVE AND COMMERCIAL HONEY PRODUCTION

BY C. H. GILBERT

The manipulation of two queens in the same hive has created widespread interest and has been the subject of much discussion in recent years. Beekeepers, hard pressed by declining exports and low prices for honey, are becoming interested in the method as a way to cut production costs. Economic conditions have caused many commercial honey producers to improve their methods of management. In order to operate on a paying basis they have been forced to do one of three things: Increase the number of colonies operated; manage their present apiaries more efficiently; or increase the amount of honey produced by each unit. The two-queen system has been recommended as a way to increase honey production without increasing the number of colonies operated. Farrar, (1*) states that honey crops can be more than doubled by using the method. Gilbert, (2) reports increased honey production by manipulating two queens in the same hive. Success is based upon greatly increased bee population resulting from the combined efforts of two queens working in the same hive. The method may appear new and revolutionary to some beekeepers but, according to Eckert, (3) its use dates back many years in the history of beekeeping.

Reports are very encouraging, but before the commercial honey producer attempts to apply the system on a large scale, he should consider all angles very carefully. Some of the methods employ special equipment which is expensive and often complicates manipulation. Standard equipment is essential to efficient operation of large apiaries, and if the two-queen method is to be applied to commercial honey production, the use of special equipment should be avoided. The regular two-queen system and certain modifications of it have been observed at the Wyoming Experiment Station for several years.

*Figures in parentheses refer to Literature Cited at end of bulletin.

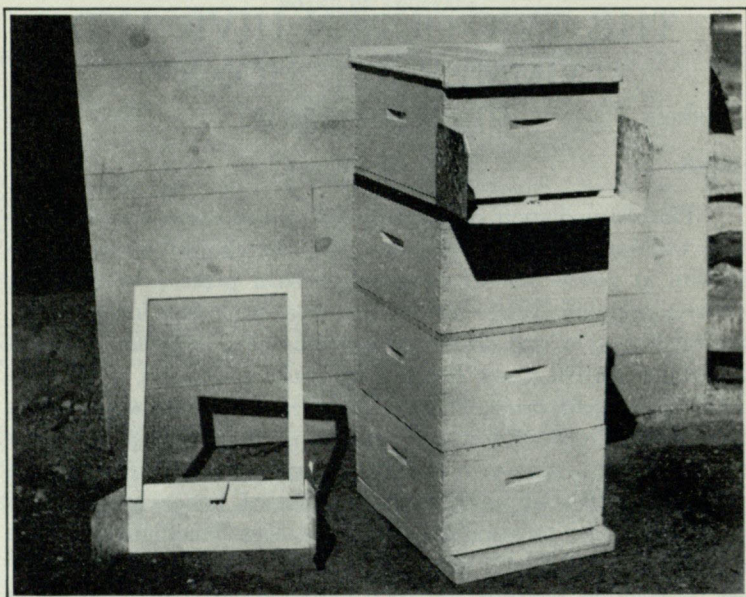


Figure 1. A Colony of Bees having a standard lower entrance and a special top entrance. Details of the special entrance are shown at the left.

MANIPULATION OF THE TWO-QUEEN HIVE

Colonies used on the experiment were headed by one year old queens that had been observed in the Experiment Station apiaries for one year. The queens were the same age and all from the same source. Selection of colonies was based on production records for the previous season, colony strength and amount of brood in each hive. Colonies of approximately equal strength were chosen but the actual bee population of each hive was not determined.

Standard ten-frame Langstroff hives were used throughout the tests for brood chambers and supers. Extra inner covers and queen excluders were required, but standard equipment was employed whenever possible. The only special equipment used was the top entrance shown in Figure 1. The entrance consisted of a wood rim one-half inch thick the size of the top of

the super. It was open at one end and equipped with a metal landing ramp. The special entrance simplified manipulation, as it could be inserted between supers at any level and was easily moved from hive to hive. Bees were permitted to move freely inside the hive, and adequate entrance room was provided without staggering the supers or drilling auger holes. The special entrance was easily located by field bees, and they could land when a strong wind was blowing.

Auger holes, three quarters of an inch in diameter, were used early in the experiment, but they were not satisfactory. The auger hole did not provide adequate entrance, could not be moved readily, supers were permanently disfigured, and field bees experienced difficulty landing when the wind was blowing.

Standard inner covers with a single screen over the bee escape hole were used entirely. Bees above the screen benefited from the heat from the lower cluster, retained the same odor, and no precautions were taken when the two clusters were united. Bees and brood were exchanged freely without difficulty.

The principle of two-queen manipulation was applied to the following: Assisting weak colonies; swarm control; requeening; making colony increase; and regular two-queen operation for the entire season.

Assisting Weak Colonies. Weak overwintered colonies having valuable queens were placed on strong colonies over a screened inner cover. A reduced top entrance was provided, and after a few days brood and bees were taken from the strong colony and placed in the upper unit. The colony was operated with two queens, and additional brood and bees were raised until the upper unit had gained sufficient strength to be self supporting. The colony was then divided and the upper unit moved to a new location. The same method was employed to save packages that had become seriously weakened by drifting. Packages reduced to a few hundred workers were built up to successful colonies by the method.

Swarm Control. The two-queen system was readily modified for swarm control. Steps in the method are shown in Fig-

ure 2, A.B.C.D. The old queen was left in Br 1 with one or two frames of brood and empty combs. The remaining brood and bees were placed in Br 2. A large number of bees were placed in Br 2 in order to insure a good sized cluster to protect and care for the young brood. After a short time the upper cluster was composed almost entirely of young bees as the field bees returned to the familiar lower entrance. In order to have a good cluster in the upper part, large numbers of bees were placed there when brood was raised to compensate for the loss of old bees. When the brood and bees were divided, the colony was assembled as shown in Figure 2 B and Figure 1. The old queen was confined to the two lower hive bodies by a queen excluder. A spacer super S1 was added, and the queenless brood chamber, Br 2, placed above.

The upper brood chamber was given a special top entrance (e), Figure 2 B, and isolated from the lower unit by screened inner cover (i), Figure 2 B. The colony was given no further attention, and the bees were permitted to rear a queen in the upper unit. If a new queen was successfully reared and mated, she was given more room, Br 4, Figure 2 C, and the colony operated with two queens until it was convenient to kill one of them. Obviously, the condition of both queens was determined before either was eliminated. The brood nests were then united as shown in Figure 2 D, and the remaining queen was placed in Br 2. All young brood and eggs from both brood nests were placed below the queen excluder, Figure 2 D. Surplus old brood and honey were placed in S 1. The screened inner cover was removed, but the top entrance was left in place. Field bees from the upper unit continued to use the top entrance, and it was not removed until they had become accustomed to the lower entrance.

Colonies manipulated in this manner became very strong, and several of them were divided after being operated for a time with two queens. The top entrance obviated the necessity of returning to the apiary at a set time to destroy queen cells, and the colony was permitted to requeen itself. Honey production was increased, colonies were requeened, and some divisions were made at very little additional cost of travel and yard labor.

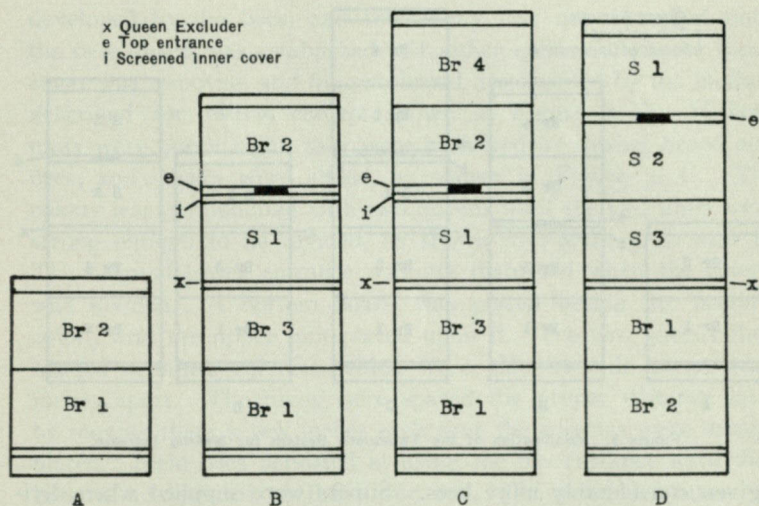


Figure 2. Modification of the Two-queen system for Swarm Control and Requeening.

Requeening. Tests were made when young mated queens were introduced and also when the bees were required to develop their own queen. The steps in the process were practically the same as for swarm control, as shown in Figure 2, A.B.C.D. Only colonies strong enough to permit splitting the brood and bees were requeened by the method. The old queen was left in the lower brood chamber, Br 1, Figure 2 A, with about one-third of the brood. The remainder of the brood and adhering bees were placed in Br 2, and the colony assembled as shown in Figure 2 B. A mated queen was introduced immediately, or the bees were permitted to rear a new queen, and no further manipulation was required until the new queen was established. The colony was manipulated with two queens until the new one was well established and it was convenient to kill the old one. The units were then united by the method described for swarm control, as shown in Figure 2 D.

When colonies were required to requeen themselves, very good results were obtained with a minimum of time and effort, when divisions were made without paying any attention to the old queen. Brood was divided equally, but the upper unit was

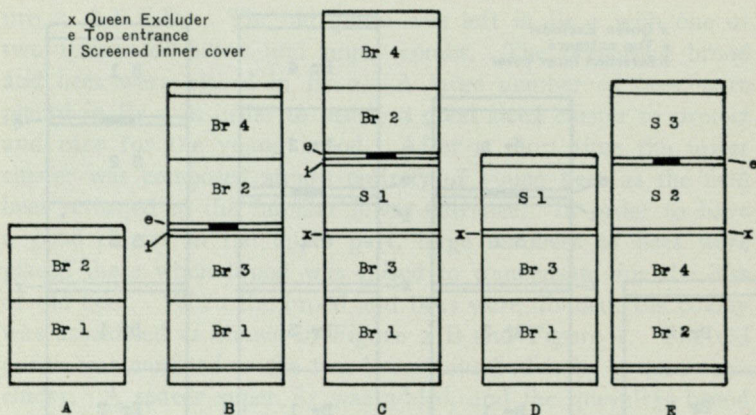


Figure 3. Modification of the Two-queen System for Making Increase.

given considerably more bees. Supers were supplied when division was made, and no further attention was required until inspections were made to determine the condition of the new queen.

Tests were made when the old queen was placed in the upper brood nest and the new queen introduced below. A larger percentage of the queens were accepted when introduced into the upper brood chamber, probably because the upper cluster was smaller and composed almost entirely of young bees.

This modification of the two-queen system gave satisfactory results. Colonies were requeened without interrupting brood rearing, and they remained queenright, even though the new queen was not accepted. The only extra equipment required was one screened inner cover and a special top entrance. Colonies so manipulated became stronger than the controls, and honey production was increased.

Making Colony Increase. Steps in the process of making colony increase by modifying the two-queen system are shown in Figure 3, A B C D E. Strong colonies only were used, and brood was divided as previously described with most of the brood and bees above. The upper brood chamber was placed above a screened inner cover and given a top entrance as shown in Figure 3, B. The mated queen was introduced above, or a queen

developed by the bees, and the colony was not disturbed until the new queen was established. If either queen failed, the inner cover was removed, and the two brood nests united by the method described for swarm control shown in Figure 2 D. If both units were queen right, they were equalized by raising brood and bees, and supers were added, as shown in Figure 3, C. The colony was manipulated with two queens until the two units were strong enough to be divided, as shown in Figure 3, D and E. The original lower entrance was not disturbed when the colony was divided. A bottom board was placed beside the original colony and the upper unit placed upon it. The two queens then headed separate colonies which were side by side about four inches apart. The hives were spaced the proper distance later by moving them a few inches each time the colonies were manipulated. Field bees persisted in using the top entrance until they became accustomed to the lower one. To avoid confusion of field bees about the top entrance, Unit E, Figure 3, was left one or two supers higher than Unit D. When the division unit was moved immediately to a new yard, the top entrance was closed permanently. The two colonies were operated the balance of the season as standard single queen hives, thus simplifying manipulation.

This modification of the two-queen system gave splendid results. Divisions were made only when strong, disease-free colonies were assured, and no extra tops or bottoms were required until they were actually divided. Honey production was greatly increased, and in some instances the units produced more than twice the amount produced by control colonies. The units which received mated queens produced more honey than those required to rear their own.

Regular Two-Queen Manipulation for Entire Year. Strong colonies only were used, and the brood was raised as previously described. Steps in the manipulation are shown in Figure 4, A B C D. Young mated queens were introduced in the upper brood chamber, and if accepted the colony was operated the entire season with two queens in the same hive. A screened inner cover was maintained under the upper brood chamber, Br 2,

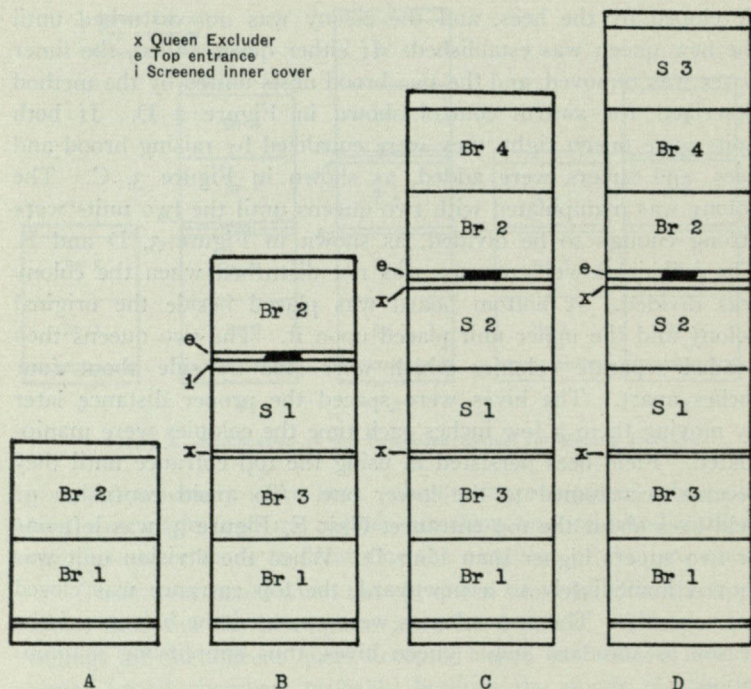


Figure 4. Regular Two-queen Management.

Figure 4, B, until the new queen was well established, when it was replaced by a regular queen excluder, Figure 4, C. Supers were added when required, as shown in Figure 4, D, and the top entrance was maintained in approximately the same position.

Manipulation became complicated as the season progressed, and yard work was increased considerably. In order to inspect either brood chamber or adjust supers the top entrance and upper brood chamber had to be removed. Bee population became high, due to the combined efforts of two queens, and there was grave danger of overcrowding. The two-queen colonies required regular manipulation, and serious difficulties arose when they were neglected. Super requirements increased greatly during a heavy honey flow, and it was almost impossible to give each unit enough supers. An apiary where comparisons were made is shown in

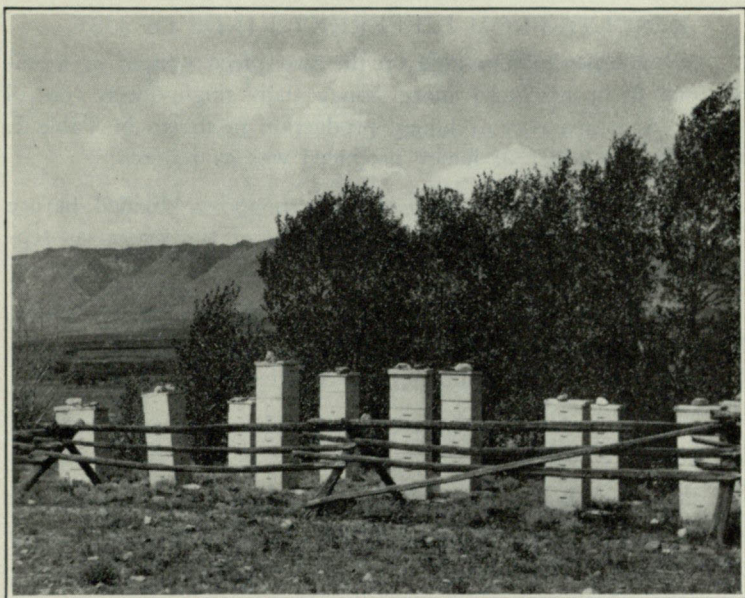


Figure 5. An Apiary in which Single-queen and Two-queen colonies were compared.

Figure 5. The four in the center were two-queen colonies. It will be noticed that at the time the picture was taken the single queen colonies had about as many supers as the two-queen hives. The supers were stacked high, the upper brood chambers were heavy, and manipulation was a difficult task. Experienced help was required for taking off honey and for supering, and the demand for skilled labor was out of proportion to ordinary unskilled yard labor. The bees in this group required far more attention than any of the other methods tested. Colonies in which two queens were maintained the entire season became very strong and produced considerably more honey than single-queen hives.

RESULTS FROM DIFFERENT KINDS OF USE

All colonies manipulated on the two-queen system or modifications of it produced more honey than single-queen control hives. A comparison of honey production is shown in Table I. The rating in order of honey produced was as follows:

First, colonies given a mated queen above, divided before the main honey flow and operated the rest of the season as separate single-queen colonies.

Second, colonies required to rear their own queen above, divided before the main honey flow and operated the rest of the season as separate single-queen colonies.

Third, colonies manipulated as regular two-queen colonies for the entire season.

Fourth, colonies in which a laying queen was introduced above, the old queen killed, and brood united as soon as the new queen was established.

Fifth, colonies required to requeen themselves, old queen killed and brood united when new queen was established.

Sixth, colonies in which brood was raised for swarm control.

Seventh, regular single-queen colonies.

Conditions under which the above tests were made were quite similar to those in other sections of the state. The colonies built up on dandelions, which were usually available in considerable abundance from early May to the middle of June. Pollen was available from late April, and a reserve supply was left in the hives in the fall. Pollen requirements did not present a problem, as ample supplies were available at all times. The main honey flow was from sweet clover, which usually came on in July and continued until early September. The rate of colony development varied from year to year, but brood was raised and queens introduced as early as colony strength would permit. Divisions were made late in June or July. Colonies were manipulated for swarm control whenever necessary. Manipulations were made as early as possible, so that the colonies could reach

TABLE I. COMPARISON OF HONEY PRODUCTION FROM 1935 TO 1939

YEAR	1935	1936	1937	1938	1939
CONTROL COLONIES					
Number colonies tested.....	4	4	4	8	2
Ave. honey production—pounds.....	174.00	198.10	128.60	242.00	60.00
SWARM CONTROL					
Number colonies tested.....	2	2	4	3	0
Ave. honey production—pounds.....	200.00	220.40	145.00	285.60	
REQUEENING					
Number colonies tested.....	4	4	6	6	8
Ave. honey production—pounds.....	210.00	223.00	149.00	270.00	80.00
TWO-QUEEN COLONIES					
Number colonies tested.....	4	4	4	8	2
Ave. honey production—pounds.....	234.00	296.80	198.50	329.00	90.00
TWO-QUEEN COLONIES, DIVIDED AND OPERATED AS SINGLE UNITS					
Number colonies tested.....	0	4	4	8	2
Ave. honey production—pounds.....		398.38	265.00	472.00	130.00

the desired strength at the beginning of the honey flow or shortly thereafter.

Limitations on the Use of Two-Queen Hives. The regular two-queen system and modification described herein can be readily adapted for use in small apiaries, but the commercial honey producer may not be in a position to apply such intensive colony management. Frequent manipulations are required in two-queen management, and the demand for skilled labor is greatly increased.

Large numbers of full depth supers are necessary for efficient operation of the two-queen system. It could not be used successfully in apiaries where single brood chambers are maintained and shallow supering is employed.

Success with the method is determined largely by the condition of the colonies in the spring, flowers available for building up, length of honey flow and the time it occurs.

Two-queen colonies require considerable time to build up and show greater returns when the main honey flow comes late in the season.

Local conditions contribute materially to success and determine to a large degree the best method to employ.

SUMMARY AND CONCLUSIONS

Various modifications of the two-queen system were tested at the Wyoming Experiment Station and all gave increased honey production as compared to single-queen hives. The increased skilled labor and attention required for manipulation will add to the costs and probably restrict its use in large commercial apiaries.

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