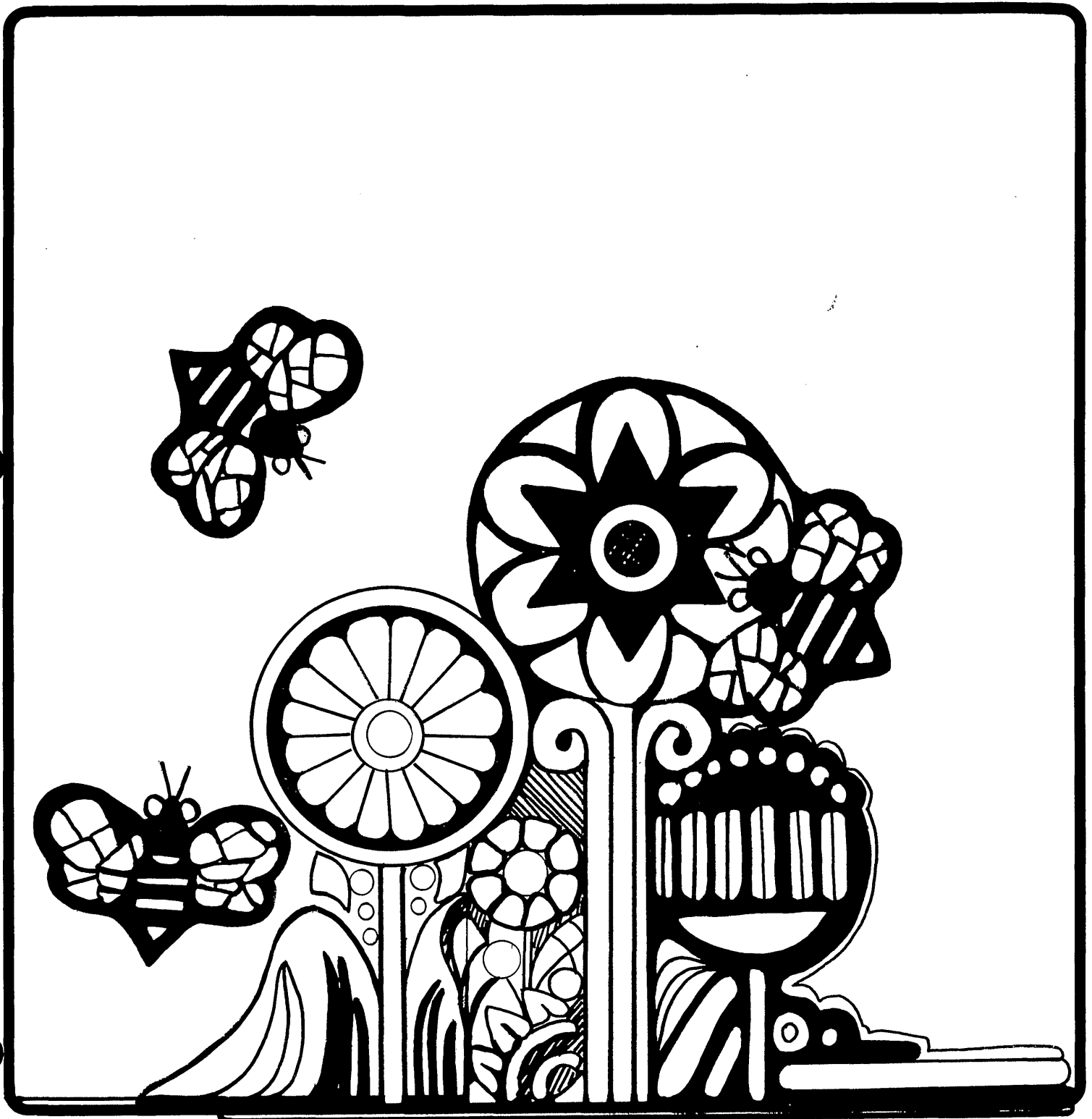


OHIO'S BEEKEEPING ALMANAC



Extension Entomology
1735 Neil Ave.
Columbus, Ohio 43210

Dear Beekeeper:

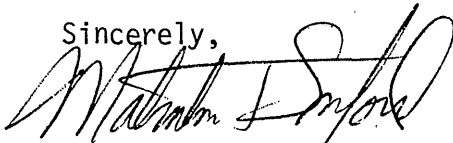
Many beekeeping questions concerning what to do with bees, when and why, come to my attention every year. The enclosed twelve issues of Ohio's Beekeeping Almanac, published in 1979 in the monthly newsletter "Beekeeping Notes," attempt to deal with these concerns. Sound management of honey bee colonies demands an understanding of the climatic and geographic factors underlying the events of the apicultural year. The purpose of this publication, therefore, is to give the beekeeper this framework to use in developing his own management philosophy.

Each month the Almanac provides a map of Ohio with average temperatures, expected rainfall amounts in the central portion of the state, a written description of the climatic conditions, as well as what honey bee, plant and beekeeper activity is or should be taking place. In addition, a beekeeper's calendar is appended at the end as a summary of the full year's events.

Ohio's Beekeeping Almanac is not an infallible guide to predicting management decisions. It's important to keep in mind the weather conditions cited are based on thirty, in some cases sixty, year averages only, and may or may not conform to those of one particular month mentioned. Beekeepers must continually adapt to short range weather events and use their own experience as a guide to helping bees during times of crisis.

It is my hope this almanac will be of use to you in the continual search for perfection in the management of one of man's most beneficial insects. I would welcome any comments from you concerning the information presented.

Sincerely,



Malcolm T. Sanford
Extension Specialist
Apiculture

jam

*You can request this publication by writing the above address.

1/81 - 4M Reprint

Ohio's Beekeeping Almanac

JANUARY

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

GENERAL WEATHER CONDITIONS

January is one of the coldest months of the year. The winter solstice (Dec. 23) is passed and there will be more hours of daylight, but the earth is still radiating more heat than it's receiving.

Average temperature ranges from 34°F in the south to 25°F in the north. Although the winter of '76-'77 and '77-'78 were both record breakers, it's the average that concerns beekeepers. Extreme temperatures are always possible--notice they may range from 78°F to -31°F at selected weather stations.

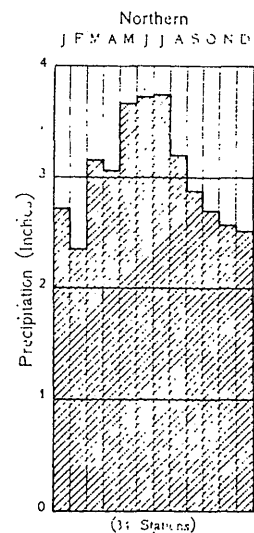
Usually there are at least 16 days when the temperature rises above freezing for part of the day in January. Possibilities for cleansing flights will occur at these times. The snow should be cleared away from the entrances allowing the insects to fly. Snowfall and sleet average anywhere from 5 to 11 inches during the month.

Precipitation in January averages about 2.7 inches. Much of it may be snow. Snow is a good insulator and can protect colonies against the ravages of wind (chill factor), but it also has a high reflectivity (albedo) that doesn't allow the earth to capture much radiation. Snow cover insulates the ground well and protects seeds and roots which will germinate in the spring.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W.H.Alexander

Station-County	Extreme Temperatures		Average	Avg. Sleet & Snow
	Max	Min	Days 32°F or under	
Napoleon-Henry	72	-19	12	8.0
Plymouth-Huron	71	-20	12	7.9
Hiram-Portage	71	-23	13	10.6
Columbus-Franklin	68	-15	13	7.0
Millersburg-Holmes	73	-19	10	7.1
Steubenville-Jefferson	75	-19	9	9.4
Jackson-Jackson	78	-31	6	6.7
McConelsville-Morgan	77	-26	7	6.6
Cincinnati-Hamilton	77	-17	9	5.4
Sidney-Shelby	61	-19	15	8.2

Source: *Climatic Guide for Selected Locations in Ohio*
by Marvin E. Miller

January is the time when ground water should be recharging; the extent of recharge may well affect honey flows in spring and summer as well as pollen production by plants. It's the colder months that are important for ground water recharge since both evaporation and transpiration (water elimination by plants) are at a minimum.

BEE ACTIVITY: The bees are in winter cluster most of the time during this month. On warm days though, the cluster breaks up and bees can take cleansing flights. Prolonged cold weather may not allow the bees to leave the hive periodically--resulting in dysentery. It can also keep the cluster from being able to move onto new food reserves. This will eliminate all but the "fittest," those able to conserve their food supply for a longer time. Stock that makes it through record winters should be conserved if at all possible by the beekeeper. Food consumption is low in January since there's little or no brood rearing going on.

VEGETATIVE GROWTH: Little growth of plants important to honey bees occurs during this month--most are dormant. Remember that some clovers are biennials so that winter conditions one year won't affect next year's growth, but the year thereafter. It's interesting to speculate on what effect the past two record winters had on the excellent flows seen this year (1978) in Ohio--in some places the best in the last 10 years.

BEEKEEPER ACTIVITY: Little can be done with the bees during this month except to observe flight activity on warm days and clear snow away from the entrance. It's not a bad idea to check colonies every once in a while to ensure that wind hasn't blown them over or torn the covers off. Some beekeeper's "heft" the rear of the colony to see how the weight fluctuates through the winter. So-called "light" ones can be fed, but be sure to do it only when the bees can get to it. Use a high concentration of sugar (eliminating need to evaporate large amounts of water) and feed as near to the brood nest (above it) as possible.

This time of year beekeepers should sit around the fire and think about next season. How many colonies will you run next year? Will you make splits? Buy packages? If so, you'd better order now so that a desirable delivery date can be scheduled by the shipper. Other concerns may be the types of management you'll do next spring or how you'll avoid swarming and pesticide damage. Making a plan for next season is one of the most productive activities to undertake at this time--how well the bees do next season can probably be well correlated with how much time the beekeeper spent making his beekeeping plan in January.

Ohio's Beekeeping Almanac

FEBRUARY

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

GENERAL WEATHER CONDITIONS

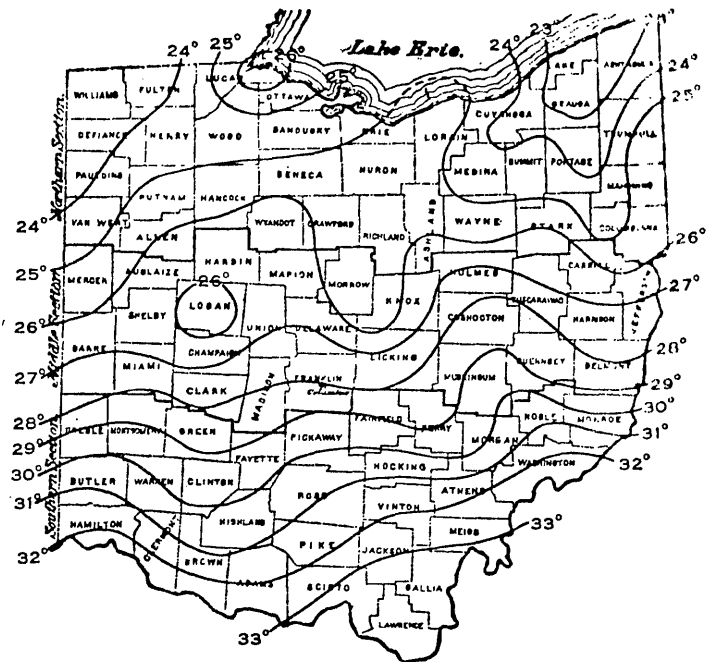
February is the coldest month of the year. Temperature ranges from 33°F in the south to 23°F in the north, a full degree colder than January's temperatures across the state. Longer days, however, begin to signal both bees and plants that spring is not far away. It can also be a time of great temperature variation. Extremes have been recorded as high as 78°F and as low as -29°F.

Fortunately as in December and January, there are at least 16 days during February when temperatures can be expected to rise above freezing providing opportunities for cleansing flights. The colder weather means more snow will stay on the ground and entrances should again be cleared as it accumulates. Snow and sleet average 4 to 10 inches during the month.

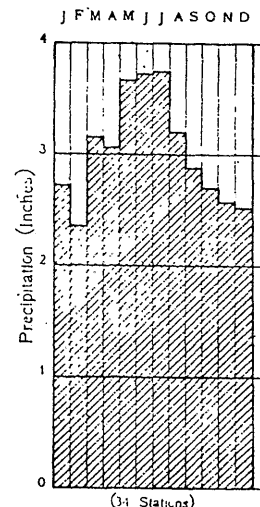
This is the driest month of the year with precipitation falling below 2.5 inches. Certain stations, however, may have more rain, sleet and snow as late winter storms of cold, dry air moving from Canada and across the Rocky Mountains collide with moist warm air masses from either the Gulf or Atlantic coasts.

Ground water, of course, is still recharging as snow continues to melt slowly during the coldest month of the year. February is an optimistic time for beekeepers--it's a harbinger of the new beekeeping year and of the rewards and excitement both bees and their keepers can look forward to.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average Days 32°F or under	Avg. Sleet & Snow
	Max	Min		
Napoleon-Henry	71	-22	10	7.3
Plymouth-Huron	71	-13	8	6.8
Hiram-Portage	69	-22	12	10.1
Columbus-Franklin	72	-11	10	6.3
Millersburg-Holmes	71	-27	6	6.0
Steubenville-Jefferson	71	-8	5	8.6
Jackson-Jackson	78	-20	3	5.4
McConelsville-Morgan	75	-29	5	6.1
Cincinnati-Hamilton	76	-9	5	4.2
Sidney-Shelby	70	-12	9	6.7

Source: *Climatic Guide for Selected Locations in Ohio*
by Marvin E. Miller

BEE ACTIVITY: The bees are still in winter cluster most of February. On warm days, the queen's egg-laying begins. It will fluctuate based on outside temperature, but in general slowly increases throughout the month. Adult winter bees, on the other hand, are nearing their lives' end and adult numbers fall off rather drastically during the last part of February and early March.

VEGETATIVE GROWTH: Outside temperature also dictates when spring plants become active. Sometimes elms, maples, alders and willows and a few other shrubs and trees are first available to bees in late February. They're prime sources of the pollen desperately needed for rearing brood to produce more bees for the active season ahead. What little nectar they produce is also immediately converted into more brood and bees.

BEEKEEPER ACTIVITY: A warm day late in February may be the first time beekeepers can inspect their colonies in late winter. At this time queenless colonies can be discovered and cases of disease are easily detected. It's early enough too that queens could still be ordered from a shipper in the south to arrive about April 1. This would allow introduction before the season is too far along.

Stores can now be judged with certainty. Colonies light on food can be bolstered along with early feeding. Again temperature is critical--use a thicker syrup in colder weather and put it near the cluster (on top) where the bees can more easily get to it.

Because pollen is so vital now, the use of either pollen supplement or substitute can be of significant value at this time. A common substitute consists of expeller-processed soybean flour, dried brewer's yeast and dry skim milk in a 3:1:1 proportion. For candy, the substitute can be mixed with hot sugar and water in a 2:1 by volume solution. Natural pollen collected and stored in a freezer or refrigerator is also an excellent spring food for bees. The source, however, should be known since it's known that pollen, like honey, can carry disease.

The importance of records needs to be mentioned at this time. They should be kept each year; describe what is done--and more importantly when it's done. They can be valuable resources to the beekeeper over the seasons. Good apicultural record-keeping like good accounting yields maximum profits. Keep your pencil sharp--and use it.

Ohio's Beekeeping Almanac

MARCH

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

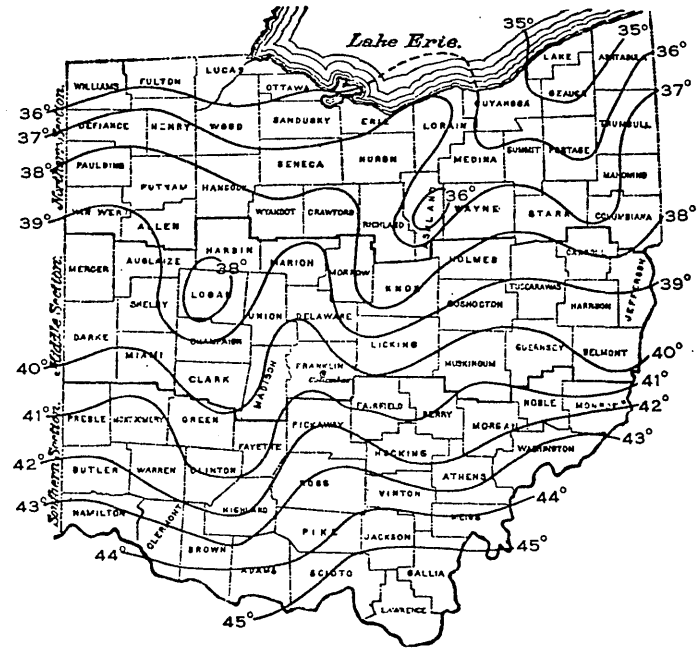
GENERAL WEATHER CONDITIONS

March is the first month of the new beekeeping year with record temperatures as high as 80°F and greater than 0°F. Average temperatures have increased 12°F to 13°F throughout the state. This means significantly more bee activity can go on now in the southern portion of the state and indicates why, even in as small an area as the State of Ohio, management procedures must be predicated in large part on local climatic conditions.

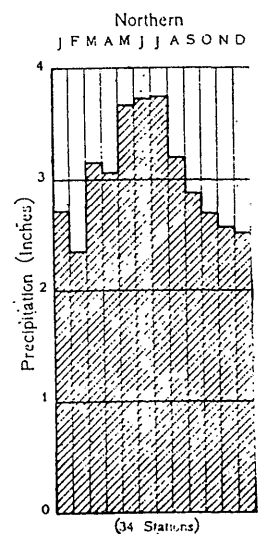
Extreme temperatures range from as high as 96°F to as low as -10°F. Number of flight days significantly increases with most stations having less than 5 days when the temperature doesn't get above freezing. March is still a cold time of year, however, and nature wakes slowly from her winter's nap. Bees and beekeepers can be caught off guard during this month. Both should act conservatively in all respects.

During March, rainfall reaches the three-inch mark for the first time since September. By now ground water should be almost totally recharged as temperature begins to increase and plants become more active. Rainfall variability increases to some extent during March, but usually is not as "fickle" as in the months of April and May.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average Days 32°F or under	Avg. Sleet & Snow
	Max	Min		
Napoleon-Henry	96	-9	3	4.6
Plymouth-Huron	82	-6	3	6.4
Hiram-Portage	81	-7	4	7.6
Columbus-Franklin	79	-2	3	5.1
Millersburg-Holmes	85	-10	2	5.2
Steubenville-Jefferson	84	-1	2	7.9
Jackson-Jackson	87	-7	1	4.2
McConnelsville-Morgan	88	-4	1	3.6
Cincinnati-Hamilton	88	3	2	3.3
Sidney-Shelby	78	-5	4	6.8

Source: *Climatic Guide for Selected Locations in Ohio*
by Marvin E. Miller

BEE ACTIVITY: This month marks a turning point in colony development. Late February and early March are usually when egg production begins in earnest. The adult bee population also reaches a critical level--it's lowest than any other time of the year. Food consumption dramatically increases with brood production. The bees can run out of food by increasing their brood rearing rapidly, -- resulting in significant detriment to the colony.

VEGETATIVE GROWTH: The early pollen producers are prolific during March. Alders, willows, maples and elms all peak this month. Some miscellaneous spring flowers are also blooming. Again, this early pollen and nectar is converted into bees and brood in expectation of the honey flows to come.

BEEKEEPER ACTIVITY: The variability of March weather is legion. Between cold periods beekeepers can check stores and inspect for disease and condition of queens. Spring feeding of syrup and pollen substitute, of course, should be considered--but be like the bees and nature--conservative in your efforts at bee management this time of year.

It cannot be overemphasized that colonies need inspection this time of year. It's estimated that a cell of honey (nectar) and one of pollen are needed to produce one bee--small wonder they use so much food so early.

Disease inspection should also continue in March. Extensive brood rearing can create stress which may lead to disease--there's always a chance that endemic levels are present causing a colony to "break down" with disease. Sure signs are perforated or sunken cappings or a noticeable "spottiness" in the brood pattern. Nosema can also show up. The symptoms are not as easy to spot as for brood disease. They can include unhooked wings and inability to sting. Crawling bees and a general disorientation can also be signs of nosema. Disease prevention starts with eliminating as much stress (dietary and otherwise) as possible in early spring. Diseases of honey bees are reviewed in Bulletin 582 entitled "Honeybee Diseases and Other Bee Pests." It's available from the Office of Information, Ohio Cooperative Extension Service, 2120 Fyffe Road, Columbus, Ohio 43210. If you suspect disease in your apiary, notify the Apiculture Section of the Ohio Department of Agriculture, Reynoldsburg, Ohio 43068, telephone (614) 866-6364.

Ohio's Beekeeping Almanac

APRIL

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

GENERAL WEATHER CONDITIONS

April brings the first real warm spring weather to Ohio. Average temperature rises to 54°F in the south and 46°F in the north. More significantly, there are on the average no days when the maximum daily temperature drops below freezing, although extremes as low as 2 have been recorded in the state.

Sleet and snow averages below 3 inches for the first time since November. Winter can be declared officially dead as the equinox is passed (March 23) and the earth is now receiving more radiation than it's emitting. The soil warms slowly signalling the beginning of the growing season.

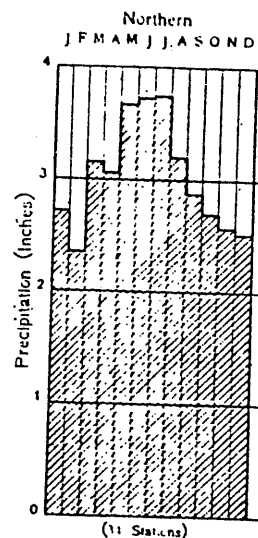
There's a slight dip in the amount of precipitation received in April compared to both March and May. This may reflect weather variability observed this time of year. April and May are months when ground water will start to diminish as there's more evaporation and transpiration (water given off by plants).

Periodic violent thunderstorms may dump large amounts of rain in localized areas in both April and May--and that greatest of wind storms, the tornado, will sometimes slash across the State depleting its fury on the land.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average Days 32°F or under	Avg. Sleet & Snow
	Max	Min		
Napoleon-Henry	90	11	0	.8
Plymouth-Huron	89	11	0	1.0
Hiram-Portage	87	2	0	2.3
Columbus-Franklin	88	18	0	.6
Millersburg-Holmes	90	13	0	.7
Steubenville-Jefferson	88	15	0	2.1
Jackson-Jackson	92	14	0	.4
McConelsville-Morgan	93	8	0	1.4
Cincinnati-Hamilton	90	18	0	.5
Sidney-Shelby	86	15	0	.7

Source: *Climatic Guide for Selected Location in Ohio*
by Marvin E. Miller

BEE ACTIVITY: Brood production is in full swing during April. Both one-day-old larvae and adult bees reach population peaks in late April or early May. More pollen and nectar is being collected and surpluses may even be gathered in exceptional years. A predominance of cool, wet weather, however, can still cause colonies to lose valuable development time.

VEGETATIVE GROWTH: This month is probably best known for the fruit bloom which washes the land with a kaleidoscope of color. Apple, plum, pear, peach and cherry all contribute as do dandelion, mustard, wild cherry and others to Nature's celebration of spring.

BEEKEEPER ACTIVITY: Package bees are normally available from the southern states and California in April. They should be installed immediately on arrival and fed heavily if desired population is to be reached by time of the major nectar flows. It takes at least six weeks for package bees to build any kind of field force--give them more time if possible.

Queens can also be introduced in April. The same advice applies as in the case of packages--install them as early as possible. Feeding, to simulate a nectar flow, usually is desired to increase queen acceptance.

Overwintered colonies on the average do better than first year packages. They're not under as much stress, have a more balanced population and usually begin the season with more bees in better physiological shape. If two brood chambers are used, they should be reversed at this time to give the queen more room and allow the bees to expand the nest upward. A cardinal rule with all overwintering colonies is to give the bees room--this promotes brood rearing at the same time preventing the colony from becoming overcrowded. Inspect these colonies regularly for food and feed if necessary. Be careful though--in good years the swarming impulse can begin early in April. And once started there's little stopping it.

Ohio's Beekeeping Almanac

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

MAY

GENERAL WEATHER CONDITIONS

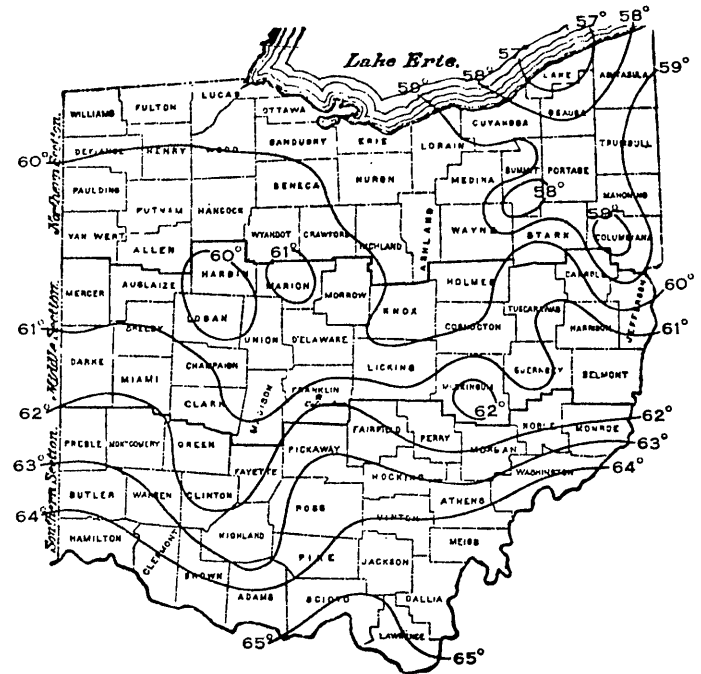
May is truly a merry month for both bees and beekeepers in Ohio. Average temperatures have risen to 65°F in the south and 57°F in the north, and lows can be expected to be mostly above the freezing point. Cold temperatures at night though can be a problem for the plants from which bees are collecting pollen and nectar. Extremes as low as 22°F have been recorded during this month.

Weather variability can also be detrimental to bees in both April and May. Cool, wet weather will delay colony build-up and there are fewer days for the foragers to collect the pollen and nectar so vital this time of year.

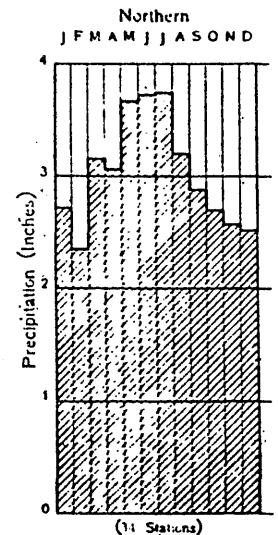
May is the first month of the beekeeping year when an average of one-half day with as much as an inch of rainfall can be expected. Greatest daily rainfall ranges from 7.73 to 1.52 in. for selected stations. Even though average rainfall is well over 3-1/2 inches, ground water is depleting as vegetative growth goes into high gear stimulated by warmer soil temperatures.

On the average there's no sleet or snow during May, and like April, it can also be characterized by thunderstorms and violent weather with tornados.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average No. Days with 1 or more inches rain	Greatest Daily Rainfall
	Max	Min		
Napoleon-Henry	98	26	.7	2.54
Plymouth-Huron	94	28	.6	7.73
Hiram-Portage	93	24	.5	2.42
Columbus-Franklin	93	25	.6	1.52
Millersburg-Holmes	94	22	.7	2.33
Steubenville-Jefferson	93	24	.5	2.04
Jackson-Jackson	95	23	.8	2.17
McConelsville-Morgan	95	25	.7	2.27
Cincinnati-Hamilton	95	28	ND	4.77
Sidney-Shelby	91	24	.6	1.52

Source: *Climatic Guide for Selected Locations in Ohio*
by Marvin E. Miller

BEE ACTIVITY: Brood rearing may be in decline in May as colonies make plans to swarm. Minor and major nectar flows are in progress, and with plenty of food available, reproduction of the species becomes a central issue in the honey bee colony.

VEGETATIVE GROWTH: The fruit bloom extends into May. The locust flow, extremely variable throughout the state, sometimes coincides with those of blackberry, white Dutch and alsike clovers. The major flows of both yellow and white sweet clover begin in late May and continue through June.

BEEKEEPER ACTIVITY: Room is a key issue for bees and beekeepers in May. A delicate balancing act on the beekeeper's part will keep the bees supplied with food and supers before the swarming impulse begins. Other swarm control measures can also be implemented from the classic Demaree method to cutting swarm cells, my least favorite and one I avoid at all costs.

Judiciously adding supers is an important part of the beekeeper's act. Some add one at a time as needed, while others put on extras since they make fewer trips to their outyards. Recent research in Louisiana indicates it's better to add several supers at one time--contradicting the idea that bees are "demoralized" if too many are added at once. Each beekeeper must make his own decision here and correlate it with his other management.

A swarm from one's apiary in May isn't worth a "bale of hay," unless caught. Bait (empty) hives are popular in some areas--the odor attracts the swarm. And there's evidence that swarms can be attracted and will land close to beeswax pellets impregnated with citral (a component of the orientation scent). Unfortunately, this substance is not readily available. It remains for some beekeepers to develop a way to collect citral from the bees. Remember--very little is probably enough. Finally, all beekeepers can and should submit their names to the many public agencies (police and fire) always getting "swarm calls" this time of year. It costs very little, and will pay great rewards in public relations if not in the traditional "hay."

Ohio's Beekeeping Almanac

JUNE

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

GENERAL WEATHER CONDITIONS

June marks the end of spring, and with coming of the summer solstice (June 23), the days become shorter. High temperatures begin to influence colony activity now. Extremes can range as high as 105°F causing bees to actively gather water for cooling purposes. Lows, on the other hand, are never below freezing. Average temperature ranges from 72°F in the south and 65°F in the north.

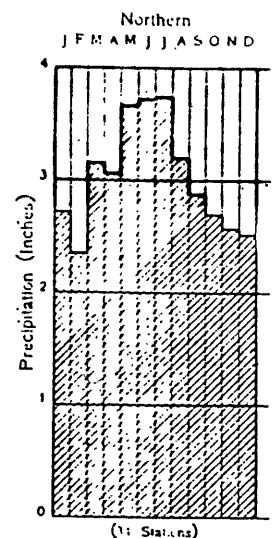
There's less variation in the weather now that the unstable months of spring are gone, but rainfall can still be spotty throughout the state. This is characteristic of most continental climates and is based on differential heating and cooling of the land. Areas near Lake Erie are greatly influenced by that large water body--it ameliorates the temperature extremes found in more inland areas.

Rainfall peaks in June and July somewhat over three and one-half inches. Most of the water though is used by vegetation and/or returned to the atmosphere. Thunderstorms become frequent this time of year dumping large amounts of rain in some areas. This month averages almost one day when one inch of rain can be expected and greatest daily precipitation ranges from 2.5 to 9 inches. Localized drought (where transpiration and evaporation exceed precipitation), however, can occur affecting nectar flows during June and the following summer months.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average No. Days with 1 or more inches rain	Greatest Daily Rainfall
	Max	Min		
Napoleon-Henry	105	36	.9	4.33
Plymouth-Huron	99	38	.8	9.13
Hiram-Portage	96	34	.8	2.50
Columbus-Franklin	96	39	.9	3.98
Millersburg-Holmes	99	35	1.1	3.49
Steubenville-Jefferson	98	35	1.3	3.66
Jackson-Jackson	100	34	.7	3.40
McConelsville-Morgan	99	35	1.0	3.92
Cincinnati-Hamilton	102	40	ND	3.46
Sidney-Shelby	100	37	.9	3.98

Source: *Climatic Guide for Selected Location in Ohio*
by Marvin E. Miller

BEE ACTIVITY: A secondary peak in brood rearing is reached sometime in June. Adult bee populations also are at their maximum and will slowly decline hereafter. The swarming season is coming to an end, and strong colonies may begin "washboard" movements or sprout "beards" on warm evenings.

VEGETATIVE GROWTH: The yellow and white sweet clover flows reach their peak in June. Other clovers, like alsike and white dutch, are also providing large amounts of nectar. Basswood begins to bloom during the middle part of the month as the blackberry and locust flows wane.

BEEKEEPER ACTIVITY: Swarming must still be on the beekeeper's mind in June, although by now the "urge" should be significantly less. It's difficult to judge how much room to give during the major honey flows. "Twenty pound days" might occur during exceptional years. I like to always err on the "too much" rather than "too little" side in providing supers this time of year.

With the active growing season comes the continuous and it seems increasing use of insecticides by orchardists, farmers and backyard gardeners. There's no escaping this menace which can come by spray for mosquito control or dust to reduce aphid populations on ornamentals. The only, albeit not always satisfactory, solution is communication with potential applicators. It's not a bad idea to see what's growing in your area and determine who's in charge. A little honey disbursed to agricultural and public officials can go a long way in saving bees.

Once you find out that spraying is imminent (the hard part), then you can make plans to move or confine your bees (the easier part). Both solutions require adequate ventilation--that means use a lot of screen. Burlap can be used to cover colonies on a short term basis. Make sure you keep the covering moist so the bees don't become overheated. It doesn't take much to suffocate a large population when so confined--be extremely careful in using this covering technique which was developed for dry climates like Arizona.

Insecticide damage should be reported to the local ASCS office immediately. Don't wait! The longer you postpone the less your chances of full payment under the indemnity program.

Ohio's Beekeeping Almanac

JULY

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

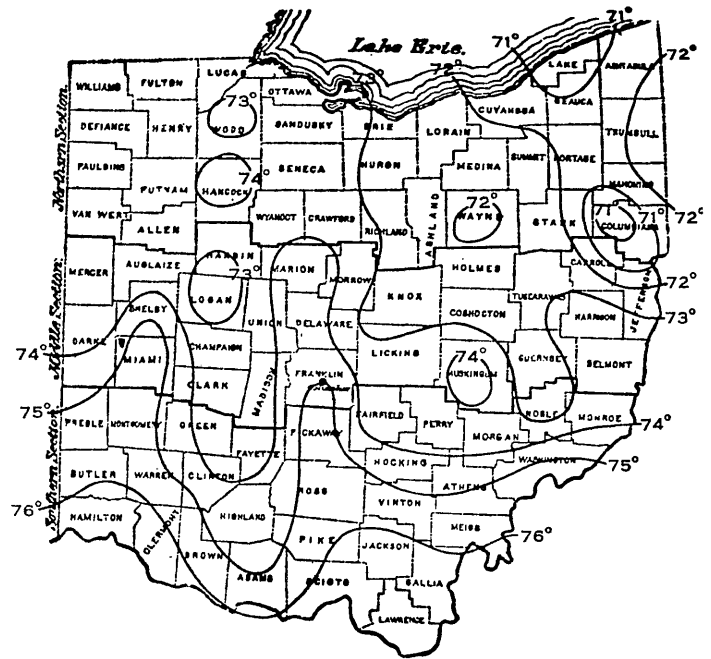
GENERAL WEATHER CONDITIONS

July signals the beginning of the end of summer beekeeping activity. I'm always reminded of the line at this time, "a swarm in July isn't worth a fly." It's also one of the hottest months with extremes up to 110°F. Average temperature ranges from 71°F in the north to 76°F in the south. Shade can become important during July and August to colonies. Ideal locations usually have entrances facing east or southeast and trees to the west. That way the bees get up early with the sun and become shaded during hot afternoons.

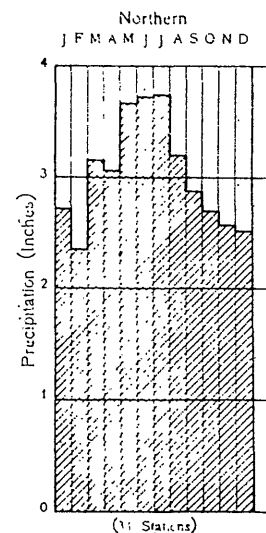
July also marks the end of the peak rainfall season--the last month with over three and a half inches. Greatest daily precipitation can be anywhere from two and a half to nine inches, and almost once a month rainfall of an inch or more can be expected. The hot weather continues to deplete ground water during the month, but vegetational growth is slowing with the warm weather.

Hot weather is a help to bees in evaporating moisture from the nectar to make honey. However, it can also cause stress, and colonies should be ventilated to avoid overheating. Enlarging entrances and staggering supers are two ways to help improve air flow through the colony. Even so, large amounts of bees may hang out of the entrance on summer nights--this is normal and no cause for alarm.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio*
by W. H. Alexander

Station-County	Extreme Temperatures		Average No. Days with 1 or more inches rain	Greatest Daily Rainfall
	Max	Min		
Napoleon-Henry	110	41	.8	3.17
Plymouth-Huron	105	43	.8	8.88
Hiram-Portage	101	40	.9	2.30
Columbus-Franklin	97	45	.9	3.32
Millersburg-Holmes	101	40	.9	3.38
Steubenville-Jefferson	100	43	1.0	6.81
Jackson-Jackson	102	41	1.2	3.76
McConelsville-Morgan	105	42	1.0	4.55
Cincinnati-Hamilton	109	50	ND	4.07
Sidney-Shelby	104	44	.9	3.32

Source: *Climatic Guide for Selected Stations in Ohio*
by Marvin E. Miller

BEE ACTIVITY: Adult numbers decline slowly in July, but not as sharply as larval population. The queen's egg-laying has been slowed, but will pick up in the later part of the month in expectation of the fall nectar flows. Much of the colony's efforts is now directed toward evaporation of moisture and cooling the hive during hot weather. It's also a time of propolis collection and general housecleaning.

VEGETATIVE GROWTH: The white sweet clover flow continues through July. However, with the exception of minor sources like buckwheat, milkweed and heartsease, there is not nearly as much nectar coming in as previously.

BEEKEEPER ACTIVITY: July is traditionally the month to begin extraction. Frames of honey are removed by a number of methods including: frame by frame using a bee brush; or collectively in supers with either fume boards, bee escapes or bee blowers. The bee escape is an excellent method in my experience, but requires some thought and planning. Be sure it's not so hot that the wax melts after the super is vacated--plan to take the supers in evening if possible. Also be careful there aren't any cracks between supers that can be exploited by robbers.

Again, this hot period can be stressful and colonies have been known to break down with disease at this time. In addition, insecticide is still being used and can damage your colonies at a critical time so they won't make a fall honey crop. Beekeepers can't afford to be complacent during these hazy, lazy days of summer.

While extracting and packing your honey crop, give some thought to entering it in the local or state fair. It's more work than packing for regular distribution, but can bring greater dividends in public relations and fellowship during the exhibition. Judges grade honey over a variety of categories--usually those most controlled by the beekeepers. These include: moisture content; crystal content; cleanliness; and foam. Consult the article by Dr. Dewey M. Caron entitled, "Preparing Honey for Fairs," Gleanings in Bee Culture, August, 1978, pp. 368-70, for a detailed list of what to do to best show your honey.

Ohio's Beekeeping Almanac

AUGUST

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

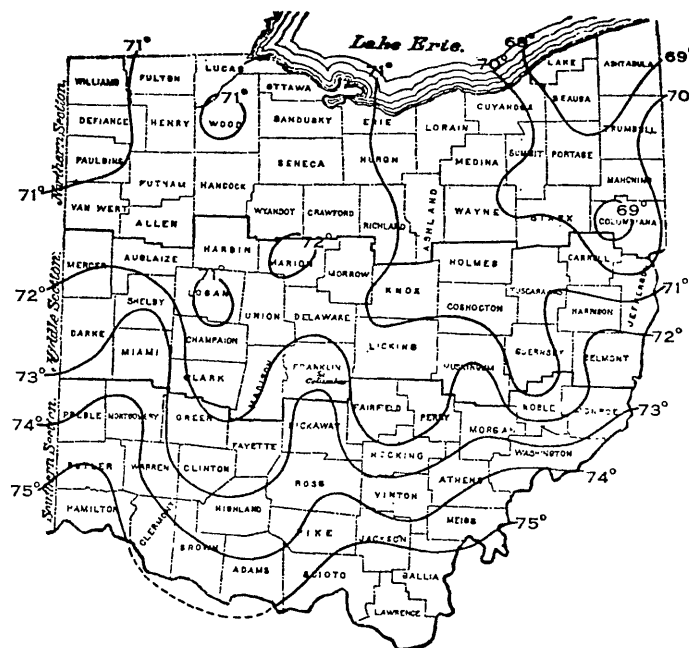
GENERAL WEATHER CONDITIONS

August's hot afternoons are sometimes dramatically offset by cool mornings. Both maximum and minimum temperatures begin to fall in response to shorter days. The land is still warm, though tenaciously holding its heat built up during the summer. Extremes have been recorded as high as 111°F and as low as 36°F. Average temperature is almost the same as July: from 75°F in the south to 69°F in the north.

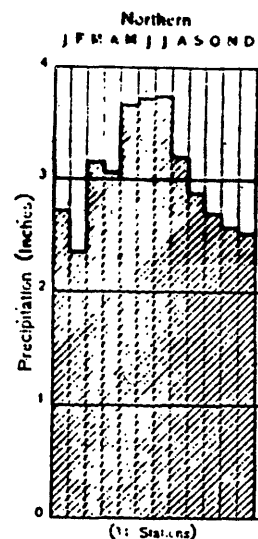
Rainfall drops to just above three inches in August. This, coupled with hot weather, can cause drought--feared by beekeeper and gardener alike. Ground water is still being depleted and there's less rainfall to replace it this month. As transpiration continues, plants become stressed and a time of little or no growth results. Too much moisture stress in August can materially affect nectar flows at this time and later in September and October.

Bees will also need increasing amounts of water if the temperature soars too high. Usually there are plenty of sources nearby, but urban beekeepers should be watchful their bees aren't using neighborhood swimming pools for water collection. If in doubt, put a watering source nearby. Nothing puts a damper on a pool party like a bunch of X*%¢ "bees." More than likely they're yellow jackets, but as usual the honey bee will get all the blame.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average No. Days with 1 or more inches rain	Greated Daily Rainfall
	Max	Min		
Napoleon-Henry	111	36	.7	4.63
Plymouth-Huron	101	39	.8	7.68
Hiram-Portage	102	39	.7	3.70
Columbus-Franklin	98	39	.5	3.12
Millersburg-Homes	101	37	.9	2.22
Steubenville-Jefferson	100	40	.8	3.50
Jackson-Jackson	101	34	.7	2.30
McConnelsville-Morgan	104	40	.7	3.60
Cincinnati-Hamilton	103	43	ND	3.48
Sidney-Shelby	99	36	.5	3.12

Source: *Climatic Guide for Selected Stations in Ohio*
by Marvin E. Miller

BEE ACTIVITY: There's a small increase of both adult bees and larvae in mid-August produced as a normal consequence of the ups and downs of brood cycling. It's also advantageous since in response to shortened days, the bees are preparing to make a last ditch effort to get stores in before winter. The queen is also about to start producing "winter bees" to take the colony through cold weather to come.

VEGETATIVE GROWTH: Usually Spanish needle, heartsease, milkweed and alfalfa are secreting nectar in August. White clover is all but done and the major fall flowers, golden rod and aster, are set to bloom. Soil moisture conditions play a major role in nectar availability this time of year--nectar secretion can be extremely variable throughout the state in response to localized precipitation.

BEEKEEPER ACTIVITY: The honey crop should be extracted now. If not, the last supers must be removed if the dark fall honey is to be kept separate from that made earlier in the season. Fall honey is generally left on the colony for bee feed during the winter.

Thought should be given to making increase and requeening at this time. Since overwintered colonies do better than freshly installed packages in the spring, it's not a bad idea to make splits. This reduces the population of each colony, but it should build to normal size by cold weather. Some feeding may be necessary, of course. However, it can pay dividends next spring.

Requeening in August and September also provides a young, prolific, reproductive individual capable of producing bees through the winter and sustained egg output the following spring. And don't forget to continue to look for disease and monitoring possible insecticide kill. Colonies severely weakened by this time of year won't make it through the winter.

If it's known you're one of those weird people interested in bees this time of year, be prepared to get a lot of phone calls. Yellow jackets, bald-faced hornets and other wasps build to large populations in August and September. You'll do everybody a big favor by answering inquiries intelligently and calmly about these so-called "bees."

Ohio's Beekeeping Almanac

SEPTEMBER

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

GENERAL WEATHER CONDITIONS

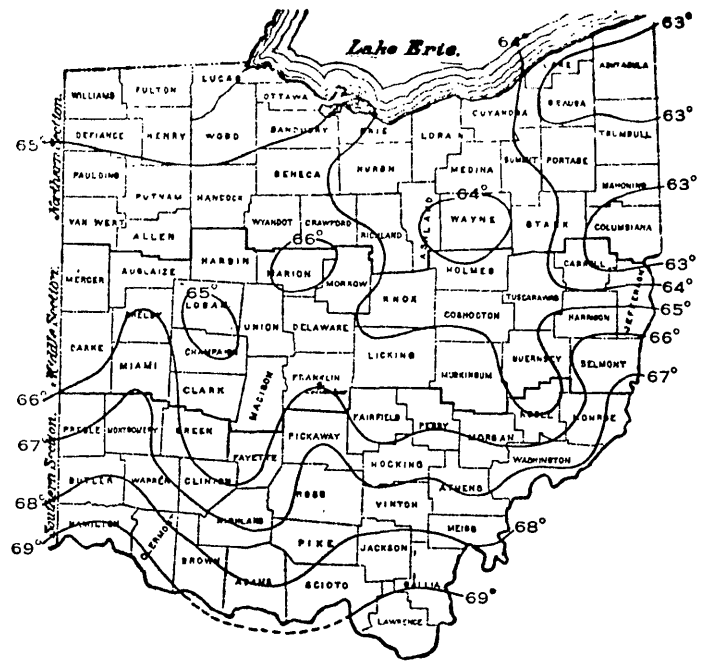
September brings the first fall weather to Ohio. Temperatures begin to decline as the equinox approaches (Sept. 23). Extremes can still be above 100°F, but lows below freezing have been recorded. Average temperature drops to 63°F in the north and 69°F in the south-- a 6°F decline from August.

Precipitation also declines in September to below three inches. And the chances of having rainfall measuring an inch or more on one day also drops for the first time below 50% at some stations. The possibility of localized drought persists, but thundershowers can still build up quickly dumping large amounts of rain in some areas.

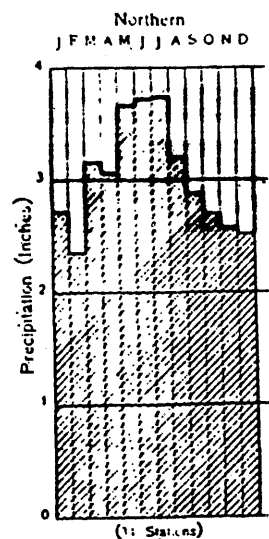
This is the beginning of tropical storm season. And although actual hurricane-force winds (exceeding 75mph) are rare in Ohio, the weather can be materially affected by moisture from either the Gulf of Mexico or Atlantic pushed inland by these great disturbances.

Early frosts and cold weather are possible in September and feared by beekeepers and agriculturalists. A killing frost is highly unlikely, but cannot be dismissed in the latter part of the month. It pays all to be prepared for the worst in the month of September.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average No. Days with 1 or More inches rain	Greatest Daily Rainfall
	Max	Min		
Napoleon-Henry	105	26	.6	3.52
Plymouth-Huron	100	26	.4	6.65
Hiram-Portage	102	27	.7	2.61
Columbus-Franklin	96	31	.6	1.76
Millersburg-Holmes	99	25	.5	2.70
Steubenville-Jefferson	101	33	.9	3.54
Jackson-Jackson	102	27	.7	4.00
McConnelsville-Morgan	104	28	.6	3.58
Cincinnati-Hamilton	101	32	ND	3.74
Sidney-Shelby	100	30	.6	1.75

Source: *Climatic Guide for Selected Station in Ohio*
by Marvin E. Miller

BEE ACTIVITY: Brood rearing continues to wind down in September. This is the traditional month when drones begin to be eliminated from colonies. The production of "winter bees," those with fat body storage organs "summer bees" don't have, is in progress. And on warm days the fall honey crop is being gathered with great urgency.

VEGETATIVE GROWTH: The flow from miscellaneous fall flowers and golden rod and aster peaks in September. In the latter part of the month, the leaves begin to turn color as the trees sever their connection with the sun in expectation of winter dormancy.

BEEKEEPER ACTIVITY: Making increase and requeening is still possible most years in September. But it must be done before sustained cold weather sets in--a possibility the latter part of the month.

Requeening may be particularly important if the bees have been damaged by insecticide. This puts an increased burden on the queen to produce more brood than normal causing her to lose strength and deplete the semen supply faster. Young queens laying in the fall will produce quantities of young bees vital to the population during winter. The swarming impulse will also be reduced next spring with a first-year queen in attendance.

September marks the beginning of the "market months"--time to sell your hard-won gain. Don't give it away either by setting the price too low. Current price information can be found in the U. S. Government's publication "Honey Market News" available from Agricultural Marketing Service, 2503 Agriculture Building, Washington, D. C. 20250, phone (202) 447-2176. Bee journals can also be a valuable source of this information. If all else fails, take a trip to local stores to see what they're selling it for. Health food stores and speciality shops are also excellent places to check out sometimes "premium" prices asked for "raw" or "wild flower" honey.

If you need to feed colonies before winter, this is the time to do it. Waiting until October may not give the bees time to properly process and arrange their stores. A thicker syrup is advised this time of year so the insects will have less moisture to evaporate.

Ohio's Beekeeping Almanac

OCTOBER

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

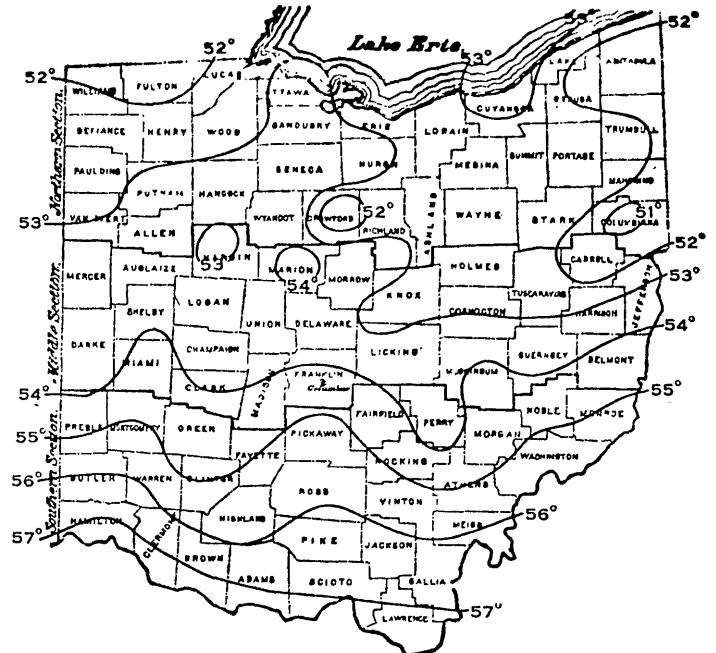
GENERAL WEATHER CONDITIONS

October is traditionally a month of color in Ohio as the leaves paint the landscape before falling in a rush of autumn wind. The equinox is passed and the shorter days, coupled with winds from the north and west, cause temperatures to begin dropping rapidly. Extremes below 20°F have been recorded, although maximum temperatures can still exceed 94°F. Average temperature nevertheless drops a full 11 to 12°F from that of September. And the first killing frost can be expected during the month.

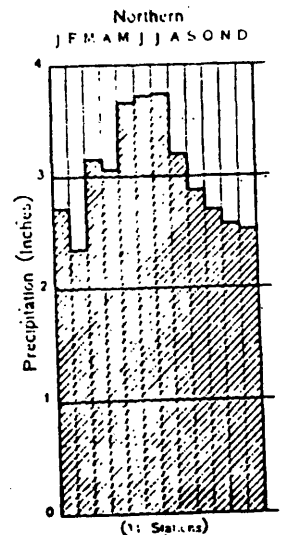
Rainfall continues to decline this month as the cooler air can no longer absorb the moisture warmer air could in prior months. Somewhat over two-and-a-half inches can be expected. October is the first month with traces of snow and/or sleet, a reminder that full-fledged winter is not far away.

Ground water slowly begins to recharge this month--October is considered the first month of the water year. Colder temperatures and a slowing of plant growth mean evaporation and transpiration (water given off by plants) are diminished. Even though precipitation is less than in previous months, the amount more than makes up for that lost to the atmosphere this month.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W.H. Alexander

Station County	Extreme Temperatures		Average No. Days with 1 or More Inches Rain	Greatest Daily Rainfall	Average Sleet & Snow
	Max	Min			
Napoleon-Henry	94	14	.4	2.78	0
Plymouth-Huron	91	20	.3	5.46	0
Hiram-Portage	88	20	.5	2.90	.6
Columbus-Franklin	86	20	.5	2.50	.1
Millersburg-Holmes	90	17	.5	2.70	0
Steubenville-Jefferson	91	19	.3	3.62	.1
Jackson-Jackson	93	11	.4	2.68	0
McConelsville-Morgan	98	17	.4	3.39	.3
Cincinnati-Hamilton	92	20	ND	2.15	.1
Sidney-Shelby	88	18	.2	1.64	.1

Source: *Climatic Guide for Selected Stations in Ohio*
by Marvin E. Miller

BEE ACTIVITY: Adult bee populations are declining in October, but not as rapidly as was the case in September. There's a small increase in larval production during the month--the last brood cycle of the active season may be expected in response to "Indian summer." On warm days, the final portion of the fall honey crop can be gathered and processed.

VEGETATIVE GROWTH: Some fall flowers are still blooming during October. But they, like the goldenrod and aster, are past their prime and only holding on until cold weather sets in.

BEEKEEPER ACTIVITY: By now the beekeeper should have or be getting his bees ready for winter. This means providing all the necessities: honey, pollen, young queens and protection for the colony. During severe winters, wrapping colonies can aid the bees in heat conservation. This is particularly true if they're not protected by wind breaks. The "wrap or not to wrap" dilemma confronts every beekeeper each year. The solution is not simple and can only be derived through experience and experimentation.

Correct arrangement of frames in a colony is also something that is important for successful wintering. Sixty to eighty pounds of honey are usually located above and to the side of the clustering area. Frames of pollen surround the brood area--an optimum population of bees this time of year is about seven to eight covered frames.

October is the major "market month" for many beekeepers. Honey can now be sold at arts and crafts shows, flea markets and other public gatherings celebrating the autumn season. The crisp weather seems to bring more "honey-purchasing" impulse out in people than the hot weather of late summer. Getting your honey on the market in October makes good sense--take advantage of it.

Ohio's Beekeeping Almanac

NOVEMBER

Extension Entomology

1735 Neil Avenue

Columbus, Ohio 43210

GENERAL WEATHER CONDITIONS

November brings Thanksgiving--a time to celebrate our heritage as a pioneering nation. That the bees are pioneers as well, should be recognized. It's been said honey bee swarms preceded the settling of the land westward, and certainly at least one species is a contemporary pioneer in South and Central America. So I believe honey belongs on the table for Thanksgiving as much as corn, cranberry or cracker stuffing.

Temperature continues to drop in November as the days become shorter. Most extremes recorded this time of year are below 0°F with maximums not over 90°F. Average temperatures range from 45°F in the south to 40°F in the north--about 11F° average decline from those in the previous month.

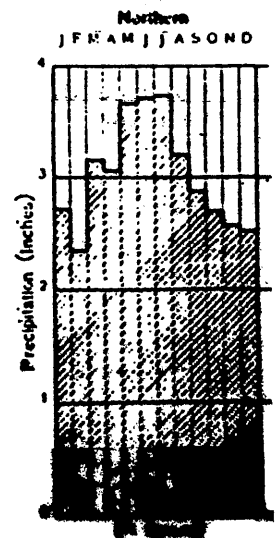
In November, precipitation begins to level off to about 2½ inches--the typical amount associated with winter. This is also the first month with any kind of snow or sleet. Up to 5 inches can be expected in some areas, although an average of less than 3 is more likely.

Ground water begins to recharge more rapidly and will continue to do so throughout the colder months of the year. Snow helps the recharge rate because its presence retards runoff and keeps evaporation to a minimum.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station--County	Extremes Temperatures		Average Days 32°F or Under	Avg. Sleet & Snow
	Max	Min		
Napoleon-Henry	80	0	1	1.9
Plymouth-Huron	80	-5	2	2.3
Hiram-Portage	80	-2	2	5.8
Columbus-Franklin	79	11	1	3.1
Millersburg-Holmes	81	0	1	2.4
Steubenville-Jefferson	85	-1	1	4.4
Jackson-Jackson	83	-11	0	2.5
McConelsville-Morgan	85	-5	0	1.8
Cincinnati-Hamilton	83	1	1	1.6
Sidney-Shelby	78	-4	2	2.7

Source: *Climatic Guide for Selected Stations in Ohio* by Marvin E. Miller

BEE ACTIVITY: Brood rearing declines precipitously in November, although warm spells may cause the queen to start another brood cycle this time of year. Adult populations somewhat stabilize and these levels will be conserved through the next two to three months.

VEGETATIVE GROWTH: The leaves are falling rapidly this month as the plants ready themselves for winter dormancy. There's virtually no nectar coming in during November although a few hardy plants are still in bloom.

BEEKEEPER ACTIVITY: Hopefully, both beekeepers and bees are ready for winter by November. The colder days don't allow much manipulation and robbing can build up rapidly since no nectar is available. Inspection should be kept to a minimum to prevent robbing.

Preventing robbing cannot be overemphasized at this time. It's insidious and can build up to high levels before a beekeeper realizes it. Once started, there's little stopping the robbing impulse. Whole apiaries have been seen to fight it out--resulting in thousands of enraged bees stinging animals and people many yards distant from the colonies.

Admittedly, this is an extreme case--but it could happen. Robbing is always a problem in the fall when no nectar is being secreted. The beekeeper must be "tuned in" on the activity in his apiary so that robbing doesn't get out of hand. He probably can't eliminate it totally, but can determine how fast it may be approaching a point of no return. Don't leave any honey, sugar syrup, or wax scrapings around--cover them up. Keep manipulation time to a minimum and keep the supers covered when they're off the colony.

If robbing starts, about all a beekeeper can do is plug off the entrance to the space of a bee or two (grass does nicely) and leave. Some people put panes of glass over the entrance to foil robbers and others running nucs use specially designed robbing screens over the entrances. Robbing spreads disease and causes problems with neighbors--don't let it get started.

Ohio's Beekeeping Almanac

DECEMBER

Entomology Extension 1735 Neil Avenue Columbus, Ohio 43210

GENERAL WEATHER CONDITIONS

December is a bleak time--perhaps that's why there are so many holidays. Christmas celebrates the winter solstice--shortest day of the year. Fortunately, New Year's Day is just around the corner.

Average temperature ranges from 35°F in the south to 28°F in the north. Extremes can range anywhere from a high of 86°F to a low of -21°F at selected weather stations.

Keep in mind that local temperature can be higher or lower depending on location. Cold, dense air, for example, may drain down slopes making it much colder for longer in valleys than on ridges. That's a good reason to keep the bees at relative higher locations during winter.

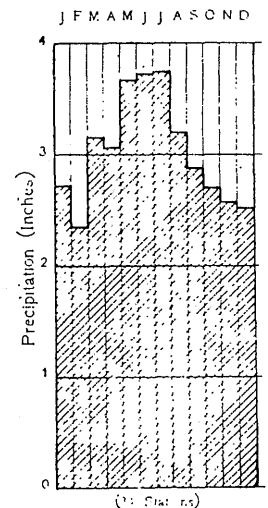
It's fortunate that there's an average of 20 or more days when the temperature gets above the freezing point. Cleansing flights are possible on those days as the temperature rises to 60°F. or so--bees may fly at colder temperatures if there's a great need. Snowfall averages from 4 to 10 inches throughout the state.

Precipitation is at its lowest in December, except for February, the only month when it drops below 2.5 inches. Rainfall is always variable throughout the state though, and certain stations may receive extreme amounts at times.

AVERAGE TEMPERATURE



ANNUAL RAINFALL DISTRIBUTION



Source: *A Climatological History of Ohio* by W. H. Alexander

Station-County	Extreme Temperatures		Average Days 32°F or under	Avg. Sleet & Snow
	Max	Min		
Napoleon-Henry	67	-21	10	7.0
Plymouth-Huron	69	-13	10	6.4
Hiram-Portage	65	-11	11	10.4
Columbus-Franklin	86	-10	11	6.4
Millersburg-Holmes	69	-18	8	5.5
Steubenville-Jefferson	69	-8	8	9.0
Jackson-Jackson	76	-16	4	4.6
McConelsville-Morgan	72	-18	5	5.1
Cincinnati-Hamilton	71	-13	7	4.1
Sidney-Shelby	67	-14	11	6.9

Source: *Climatic Guide for Selected Locations in Ohio*
by Marvin E. Miller

BEE ACTIVITY: Colony activity is at a minimum. No brood rearing is usually going on and the low temperatures cause the bees to remain in winter cluster for prolonged periods. Food consumption is low since there's so little other activity.

VEGETATIVE GROWTH: Plants are dormant during much of December, resting for the great surge of growth next spring. The last leaves have fallen, and the evergreens are the only plants still giving color to the landscape.

BEEKEEPER ACTIVITY: The beekeeper may still be marketing his crop during this month, but most of it should already have moved. Time to clear up the books and clean up the equipment has arrived.

During December, I find that the byproducts of the colony can be profitably utilized by the beekeeper. Nothing makes quite so nice a Christmas present as a lovely, aromatic beeswax candle. Candles can be molded in most anything from old tin cans to milk cartons. The big problem for most amateurs, I believe, is size of the wick. It must be thick enough to accommodate the diameter of the candle you're molding. Most wick manufacturers or hobby supply stores will give you information on wick sizes--heed them!

Another lovely product which takes more capital investment and patience is homemade mead. Capping washings are a natural base for mead production. And it can save honey--you'd be surprised at how much can be washed off the cappings to make perfectly marvelous mead. Furthermore, fermentation will be somewhat slow during this cool weather, which gives a better product. A standard recipe uses anywhere from 3 to 4 pounds of honey per gallon of water. The lower figure results in a dry wine, the latter in a sweeter one. Add to the mixture 1 level teaspoon citric acid (juice of 2 to 4 lemons), 1/4 pint strong tea, yeast culture (all purpose Montrachet is good), yeast nutrient and 1 campden tablet to rid the mixture (must) of unwanted yeast. Let the must ferment until clear and siphon (rack) the clear top wine into clean jars for further fermentation after 3 weeks. Bottle in another 10 weeks or so when fermentation has stopped. This discussion is necessarily sketchy--if you're serious about mead making, I'd recommend borrowing a wine-making book from a local library for details. The big problem with mead is that you have to age the stuff before drinking--some recommend 7 to 20 years. Mine has never made it past the first.

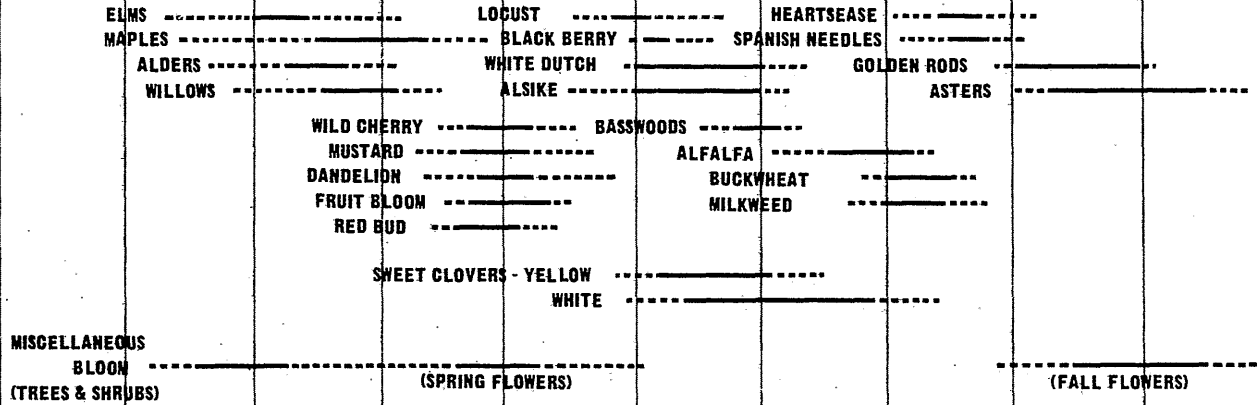
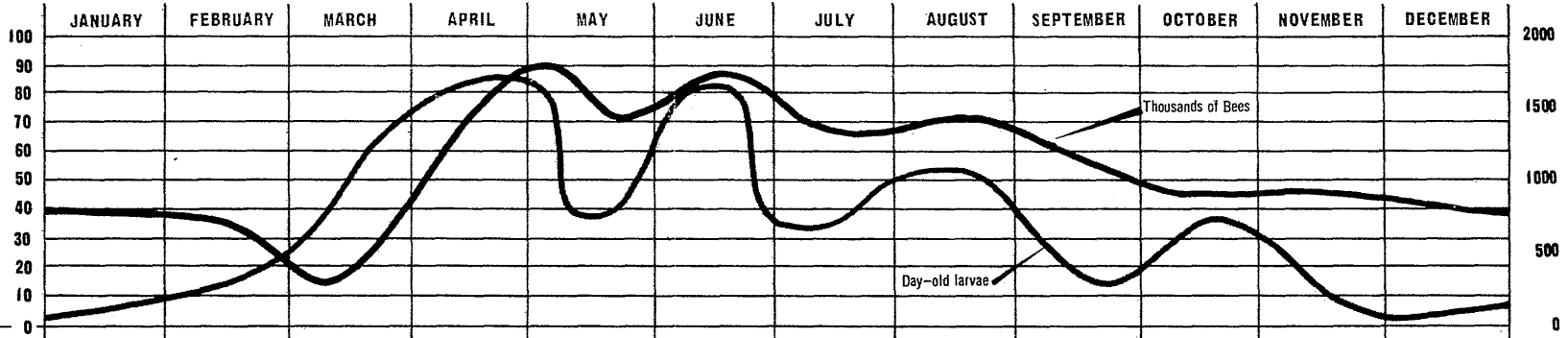
ADULT BEES AND BROOD

SOURCES OF POLLEN AND NECTAR

HIVE EQUIPMENT POSITION AND ADJUSTMENTS

THOUSANDS OF BEES

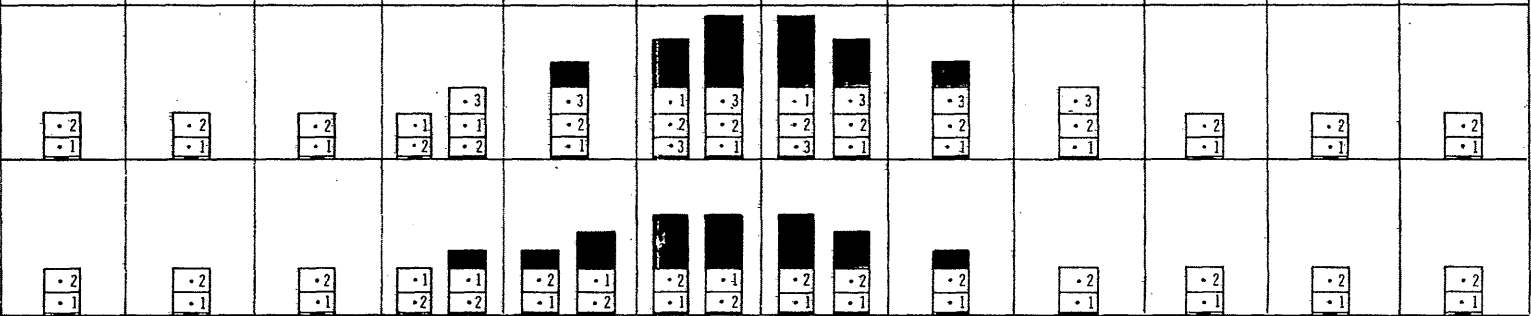
DAY-OLD LARVAE



EXTRACTED HONEY

CHUNK COMB HONEY

MANIPULATIONS



Inspect for position of cluster and stores.

Inspect for laying queen, ample stores, properly positioned cluster.

Repeat inspections and feedings. Clip queen's wing and mark. Inspect for disease.

Inspect weekly for swarming. Add supers. Re-queen.

Remove honey, extract, pack. Remove supers. Re-queen.

Inspect for laying queens and disease. Remove last supers.

Arrange brood nest for winter. 60 pounds honey, mostly in 2. Bees covering 7 combs, mostly in 1. Put entrance cleats in place.

■ SUPERS

□ BROOD CHAMBERS

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