ABSORPTION AND TRANSPIRATION (AS AFFECTED BY TEMPERATURE AND HUMIDITY)

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY Ernest Michael Rudolph Lamkey

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I

Introduction.

External physical factors have long been known to affect the rate of water loss from the leaf surface. That light influences the rate of transpiration has been known since the time of Hales (1738). Hales and Guettard (1748-49) knew that the hygrometric conditions of the air had an influence on transpiration. Mariotte (1679), and likewise Hales (1726) and Guettard (1749) knew that temperature changes influenced the water loss through evaporation. Wiesner (1887) was the first definitely to point out that air in motion affects the rate of transpiration. Later day investigators have worked with all of these factors with more or less success. Practically all of the work is open to the objection that certain factors either have been neglected or not at all controlled. In the few cases where conditions have been controlled, the results are inconclusive because of the short period during which the plants were exposed to the factors. No attempt is made to

present a complete history of the varying and conflicting results which different investigators have attained in their attempt to correlate transpiration with physical conditions. Essentially all of this history is given in the monographs of Kohl (1886), Kosaroff (1897), Eberdt (1889, '95), and Burgerstein (1904). It is of interest, in this connection, to note that while earlier workers recognized the importance of maintaining all external factors constant save the one under experimentation, later workers have well-nigh neglected so important a principle.

If, in recent years, little attention has been paid to the control of conditions, still less has been paid to the relation between the absorption of water and transpiration. Sachs (1859), Kosaroff (1897), and Molisch (1897) were able to produce wilting in plants by subjecting the root and shoot of the plant to unlike temperatures. This wilting they attributed to the excess of transpiration over absorption. Kohl and Eberdt likewise knew that by raising the temperature of the root the rate of absorption of water was increased. Kohl also carried on a series of short experiments showing the relation between absorption and transpiration. Much later, Lloyd (1908, '13) showed quantitatively that wilting is associated with a difference between absorption and transpiration; but, since he worked with cut branches, his results are not of great value, for Freeman (1909) has shown that transpiration from

cut shoots may be the same as that of the rooted plant or may vary as high as 27.3 percent from the normal transpiration, depending upon the plant species and rate of transpiration, while Munscher (1915) has shown that such transpiration may be 20 or 30 percent less than the amount lost by the same plant when rooted. The most valuable experiments are those of Vesque (1876-'78) in which the effects of the temperature of the soil upon the intake of water is noted and absorption is directly compared to transpiration. In his experiments he attempted to show the effect of varying conditions upon these processes, but his control was not sufficiently precise.

Before going into the actual experimental phase of the subject, it seems advisable to compare the curves of absorption and transpiration obtained from plants grown under the normal conditions of the growing season.

From Plate I it may be seen that while the curves of absorption and transpiration take the same general course, their maxima are at different points. Absorption is considerably in excess of transpiration from 5:16 P.M. upon the first day until 6:16 A.M. upon the second day. From this latter point on, however, transpiration rises above absorption. At 3:16 P.M. of the second day, the curve of transpiration cuts across that of absorption and from that time until 5:30 A.M. of the third day absorption is in excess of transpiration. At 5:30 A.M. transpiration again rises slightly above

absorption, falls slightly below it at about 6:45 A.M., and at 8:16 A.M. rises abruptly and henceforth transpiration is greatly in excess over absorption. The curves of Plates II and III show the same thing with only minor variations. Similar curves may be seen for mays on Plates IV and V. In the study of Plate V, it should be noted that the apices of both curves are much lower on the first day than upon the second, and this is to be attributed to the cloudy weather which prevailed upon the first day.

These curves are presented as typical examples of numerous observations made during the summer of 1915. These curves show that the loss of water is greatest in the morning and begins very early. Absorption, on the other hand, exceeds transpiration in the afternoon and the plant stores water during this period. The amount of water gained in the afternoon may exceed that which is retained at night, a fact which does not seem to have been generally recognized. It is noteworthy to point out that in the observations the plants began to wilt slightly at about 9:30 A.M. and continued until the greatest wilting was noticed at 1:15 and 2:15 P.M. From 2:30 on, recovery was rapid. This corresponds nicely with the quantitative results expressed in the curves of Plates I and II. In the other cases conditions were not extreme enough to produce wilting.

II

Apparatus.

The apparatus used was designed for the purpose of measuring the amount of water taken up through absorption and that given off through transpiration by plants grown under known and constant conditions of temperature, light, humidity, and air circulation. The apparatus necessary to meet these conditions was, (1) plant chambers, (2) electro-thermo regulators and heating coils, (3) a gas meter together with a device for mixing water vapor and dry air to a known humidity, (4) nitrogen filled tungsten lamps, (5) a potometer for measuring water absorbed, and (6) scales for measuring water transpired.

1. Cases (77 cm. high by 48 cm. square) with glass sides and tops were used as experimental chambers. Access was had to the chambers through a hinged glass door which completely took up one side. These chambers could be darkened by specially provided covers suspended from the top. They stood upon special bases of wood (24 cm. high by 46.5 cm. square) provided with a small hinged door opening upon the front. Thirteen centimeters from the bottom of each base was a glass stage with ample room left at back and front for the circulation of air. This stage supported the scales, evaporometer, and other apparatus. Beneath it were the electric heating elements.

2. The heating elements consisted of nichrome wire

wound upon asbestos board and connected with the electric circuit through a thermo-regulator capable of controlling the temperature within five-tenths of a degree centigrade. Thermometers were suspended in the cases to test the temperature regulation.

3. The humidifying device consisted of two large calcium chloride cylinders furnished with water and fused calcium chloride respectively and connected with the compressed air supply. Rubber tubes leading out of these cylinders were joined together by means of a glass "Y", and the air was mixed to the desired humidity by means of stop cocks in each arm of the "Y". The resulting mixture, which had attained the same temperature as the experimental chamber by passing through the cylinders, was played against the inside top of the case in the exact center, and by thus displacing the air already contained in the case maintained a humidity of such constancy that little attention was demanded of the operator. This introduction of air, creating a slight current, gave an equal distribution to the warm air arising from the heating coils beneath the glass stage. The current of introduced air was of such low velocity that it could not be detected by any disturbance to the leaf surface. Three hundred and twenty liters of air were introduced every hour. This was measured by a meter which gave readings per hour or minute. The accuracy of the humidity control was judged by hair hygrometers suspended at the leaf level of the plants tested. These hygrometers were standardized in a saturated

chamber and then re-set to coincide with the readings from a psychrometer at each and every humidity used for a given experiment. The humidity never varied more than one percent above or below that required.

4. Light was kept constant by means of five hundred watt nitrogen filled tungsten lamps. The current passing through the filaments of these lamps was constant, being controlled by an automatic volt regulator at the University lighting plant. The lamps were placed in a horizontal position in black metal boxes (29 cm. deep, 26 cm. wide, and 26 cm. high) with a hinged door opening at the front. These boxes rested upon truncated pyramids 49 cm. high, which in turn sat upon the tops of the plant chambers. The heat generated by the lamps passed off in the air which had entrance at the bases of the pyramids and had exit through a four inch hole in the top of each metal box. The pyramids, as well as plant chambers, bases, and covers, were painted white, inside and out. The distance of the lamps from the leaf surface was 109 cm. The light was of an intensity and quality sufficient for the normal development of the plants tested.

5. The potometer used was a modified type of one devised by Professor Hottes and used for years by him in his laboratory. The potometer -- a modified Mariotte flask -- consists of an inverted burette fitted with a stopper bearing two holes. Through one of these holes extends one end of a right-

angle tube. Through the other extends the free end of a tube of small bore which is bent back upon itself in such a way that the opening of the tube on the inside of the burette is directed downward. This tube is fitted with a stopcock and conducts air only. The plants are grown in aspirating bottles with the tubulature at the base. To set up, the burette is filled with water, the stopper with the cock of air tube closed is inserted, the burette is inverted, the right-angle tube is fitted to the tubulature of the aspirating bottle, the aspirating bottle is filled with water, then the air tube (this tube is so fitted in its hole in the stopper that it may be easily moved up or down with little friction) is adjusted until its upper opening is on a level with the water in the neck of the bottle, finally the air cock is opened, and the system is in working order. As the plant uses water from the bottle, the level falls below the opening of the air tube and the pressure in the two systems is equalized by air entering the burette through the air tube. The advantage of such a potometer is that large or small quantities of water may be measured without sealing the absorbing system from the air and without injecting water into the plant because of a water column which extends above the root or cut end of the plant. In other words, the water pressure remains constant at the level of the absorbing surface.

6. The scales employed to measure the water of transpiration were equipped with jeweled bearings of agate, and

thus error arising through the accumulation of rust at high relative humidities was eliminated. These scales were found to be sensitive to one-thirtieth of a gram, but readings were only taken to within one-twentieth of a gram. The scales rested upon the glass stages in the bases of the experimental chambers. The potometer, clamped to a ring stand, was carried upon the scales.

III

Methods.

1. Cultural methods.

The variety of Phaseolus vulgaris known as "Extra Early Valentine Green Bush Beans", supplied by J. M. Thorburn and Company, New York, was used. This seed had a very high percentage of germination and produced vigorous seedlings. In culturing the plants, the seeds were soaked for twelve hours in water, then placed between filter paper, and, when the radicles were one inch long, were transferred to paraffined wire screens over glass aquaria containing tap water. When the hypocotyl was about two inches in length, plants of uniform size and vigor of growth were selected, and three placed in the neck of each aspirating bottle. These bottles had a capacity of two hundred and thirty-five c.c. and were covered with black paper to protect the root system against light. The plants were grown in these bottles, and when ready for experimentation, the potometer was attached to the tubulature. This eliminated shock or injury to the root system which might have been caused by transferring seedlings at the beginning of an experiment. Two sets of plants in different developmental phases were used. One set had completely developed two simple leaves; the other had developed in addition a complete trifoliate leaf. All the cultural work was carried on in a well

lighted greenhouse with temperature automatically controlled at 20^{o} centigrade, and with a relative humidity which seldom varied outside the limits of fifty-five and sixty-five percent.

The variety of mays used was "Reed's Yellow Dent", grown upon the agricultural plots of the University of Illinois and selected from the harvest of 1914. The seed showed an almost perfect percentage of germination and produced uniform and vigorous plants. The same general methods of culture as used for Phaseolus apply to mays.

In growing the cultures it was the purpose to obtain normally developed plants. For this reason the plants were grown in the water from the wells of the University of Illinois. The water is in effect a nutrient solution in itself. Its analysis in milligrams per liter is as follows; - Minerals, KNO_3, 2.3; KCl, .8; K_2SO_4, 2.0; K_2CO_3, 6.4; Na_2CO_3, 81.7; $(NH_4)_2$ CO_3, 7.5; $MgCO_3$, 105.3; $CaCO_3$, 144.8; $FeCO_3$, 4.4; Al_2O_3, .6; SiO_2, 15.8; Bases 3.4: Total 375.0. Albumenoids are less than .1 mg., nitrites less than .1 mg., and free ammonia about 2.4 mg. per liter. Plants grown in this solution appeared to be in better condition than those cultured in nutrient solution, and it was very easy to grow green beans to market size. The water used by the plants was replaced daily, and a new supply, thoroughly aerated, was given every other day.

2. Manipulations.

Upon beginning an experiment, the experimental chamber was brought into the desired temperature, humidity, and light relations. The potometer and aspirating bottles containing the plants were filled with water of the same temperature as the air in the case and placed upon the scales in the experimental chamber. Each case contained two scales, and usually plants in the developmental phases already described were simultaneously treated. Beginning with the time when the plants were first placed in the chamber, hourly readings were made of the potometers and scales. The potometer was read through the glass door, and the weighings were made by manipulating the rider upon the scale beam by means of a wire arm. After the experiment had been completed, the plants were returned to their original environment and their condition noted for several days. Areas of the leaves were computed by means of a Caradi Roller Planimeter from tracings made at the end of each experiment.

A standardized porous cup evaporimeter, attached to a potometer of the style devised by Professor Hottes, was placed in each chamber as an aid in the control of factors affecting transpiration.

3. Precautions.

All plants were grown under uniform conditions previously to the experimental time, as it was found that

experiments were not comparable unless the plants were grown under identical conditions. Plants were shielded from direct sunlight at mid-day.

All plants showing injury to leaf surface or root system were rejected.

Since variations in temperature affect the gas above the water in the potometer tube and consequently the reading of the meniscus, time was allowed for this air volume to reach the temperature of the experimental chamber before a reading was taken. A few minutes at the beginning of each experiment was found sufficient. If measurements were made under fluctuating temperature conditions, corrections were made in the potometer readings to allow for the expansion or contraction of the gas enclosed in the burette.

IV

Results.

Results secured from the experiments are presented under two heads, namely, --

1. Results secured from experiments in which all conditions were constant except light.

2. Results obtained from experiments in which all factors are uniformly maintained, except that the plants were subjected to light (intensity constant) and darkness periodically.

1. Results Secured From Experiments in Which All Conditions Were Constant Except Light.

A glance at Table IX, and Plates VI, VII, VIII, and IX representing Tables VI and VII shows that only three of the cultures exhibit a curve comparable to the curve obtained from plants grown under normal growing conditions (Plates I and II). It is the younger developmental phase which invariably shows this curve. In this developmental phase, the transpiration which takes place at night is only a small fraction of that which takes place during the day. In this respect the curve approaches that of the older developmental phase grown under normal growing conditions. With all conditions except light controlled, transpiration in plants of the older developmental

stage seldom falls off more than one-half during the night. On the other hand, plants in both developmental phases show a maximum of transpiration and a wilting or lack of turgidity in much the same manner as plants grown in the open. Evidently the periodic factor light produces far greater effects upon the young plant than upon the older one. The factors of temperature and humidity, usually periodic, together with light would probably account for the big dropping off of transpiration in plants grown beyond the seedling stage under normal growing conditions. That falling temperature may account for the drop in the rate of transpiration at night is shown on Plates X and XI (representing older developmental phases) where a drop of about eight degrees resulted in a big depression in the rate of transpiration. Such a fall in temperature, at night, would have little effect upon plants in the young developmental phase, for transpiration is already almost at a minimum. From these considerations, it must be concluded that periodic factors affect a given plant differently during its different physiological stages.

Tables X and XI show that the same holds true at 25° with a relative humidity of 45 percent. Table XII shows the course of transpiration with a temperature of 20° and 50 percent relative humidity. Here, in both phases, the difference between the transpiration during the night and during the day is slight, -- a slight maximum, only, occurring during the

day. Evidently we must conclude that under certain environmental conditions periodic factors show little or no periodic results.

However, a perusal of Table XV and the curves representing Tables XIII and XIV tells an entirely different story. The curve of transpiration for young plants represented in Plate XII and Table XVI represent a period in the development of mays at the time when the leaves are unrolling after having broken through the coleoptile. The transpiration curve, in these cases, shows fluctuating variations without any periodicity. However, during the morning of the second day, the curve represented on Plate XII shows a steady rise. This is probably due to the rapid development of leaf surface which is taking place. Plates XIII, XIV, and XV represent transpiration curves of well developed mays plants. It is seen that these curves closely approximate those obtained from plants grown under normal growing conditions (Plates IV and V). Light, then is the predominating factor in producing the periodic difference between day and night transpiration in mays. Here again a drop in temperature or rise in humidity during the night would have little effect, as transpiration is already near its minimum. We must conclude that periodic environmental factors affect different plant species differently.

2. Results Secured From Experiments in Which All Factors Were Uniformly Maintained, Except That the Plants Were Subjected to Light (Intensity Constant) and Darkness Periodically.

A study of Tables XVI, XVII, and XVIII shows that the curves of absorption and transpiration for plants grown at 35°C., 30°C, and 25°C. and relative humidities of 45 percent. follow the same general course as do the curves of plants grown with all conditions except light controlled. That is, the transpiration of plants in the older developmental phase does not drop proportionally as far at night as does that of plants in the younger phase. The maximum of transpiration is found at practically the same hour as in the previous experiments, although the intensity of light did not increase toward mid-day. It would seem from this that the increased transpiration which at times results in wilting near mid-day is due to exposure to conditions slightly above the optimum rather than to increasing intensities. Further evidence in support of this is found by the observed fact that at a temperature of 35°C., and a relative humidity of 45 percent, plants were often observed to wilt at or near midnight after a recovery from a mid-day wilting (Tables VII, IX, XVI, XXI). At 30°C. and 45 percent. relative humidity plants in the older developmental phase showed no wilting at all upon the first day, but only a slight flaccidity in the early morning of the second day of the experiment. This is additional

proof that increased transpirating and wilting near noon is due to the duration of the stimulation rather than the increasing intensity. Table XIX shows that the transpiration of plants in the older developmental phase grown at 20°C. and relative humidity of 45 percent. exhibits no periodicity, while the transpiration of plants in the younger phase still shows this periodicity. However, at 15°C. as pronounced a periodicity occurs in the older phase as in the younger (Table XX).

Transpiration curves of plants grown at 35°C., 30°C., and 25°C. with a relative humidity of 75 percent. follow the same general course as do those grown at a relative humidity of 45 percent.(Tables XXI, XXII, and XXIII). At 20°C. the transpiration of plants in the older developmental phase shows an uncertain periodicity while that of the younger phase still retains a slight periodicity. A marked difference appears between day and night transpiration at 15°C. and a relative humidity of 75 percent. At the same temperature but with a relative humidity of 25 percent. this difference is much more pronounced and wilting may result. This again would indicate that an excessive transpiration is caused by long continued exposure to a stimulation of constant intensity, and not necessarily due to the increasing intensity of the periodic factor under observation. This is a fact which Briggs and Shantz (1916) have entirely overlooked.

Attention should be called at this point to a possible difference between absorption and transpiration under the conditions which give rise to the results above noted.

Table XXVII is a summary of all tables, showing the total water absorbed and transpired for 24 hour periods. The periods chosen for this table include, it will be noted, only that part of the observation time that is free from any stimulation due to a change of conditions. Other periods, for obvious reasons, might give different results. A reference to this table shows that at relative humidities of 45 percent, with temperature above 20°C., transpiration, with only a few exceptions, is in excess of absorption. At 20°C. and with a relative humidity of 45 percent, transpiration is in excess in approximately 50 percent of the cases. This apparently is a critical temperature. With a temperature of 15°C. and a relative humidity of 45 percent, the transpiration of plants in the older developmental phase always exceeds absorption. The younger developmental phase retains much the same relation as at 20°C. At relative humidities of 75 percent, no constant relation holds between absorption and transpiration with temperatures of 35°C., 30°C., and 25°C. At 20°C. and relative humidity of 75 percent, absorption exceeds transpiration in all cases. With a temperature of 15°C. and a relative humidity of 75 percent, absorption exceeds transpiration in all cases except one where the difference is so small as to be negligible. In the young phase, under the same conditions, absorption does not vary by more than .05 of a gram from transpiration. These results are in harmony with the observations made which showed that Phaseolus showed the best development (not necessarily increase in length) near 20°C.

In the growing of beans in the greenhouse it was also found that this temperature resulted in good development. It is difficult to explain why periodicity disappears at 20°C., unless it is assumed that the conditions under which Phaseolus grows best are not intense enough to produce a marked difference between day and night transpiration.

The above considerations might lead one to put more faith in Ball's (1910, '11) view that the limiting factor, in the development of Gossypium, is the root system. Lloyd's (1913) objection to this view is that the increased intensity of sunlight upon days when wilting occurs may more than balance any resulting injury by the increased production of photosynthates. This objection is not valid, for he assumes that the increased intensity of light is accompanied by increased temperature. It has been pointed out by Blackman and Matthaei (1904) that an increase in the intensity of one factor without an increase in some other factor (limiting factor) will result in no increase of carbon dioxide being fixed by plants. In this work it was found that wilting took place at relative humidities of 25 percent with a temperature of 15°C., -- a temperature too low for the rapid fixation of carbon. Lloyd completely neglected the fact that wilting may be caused by factors other than increased light intensities. A further point overlooked by Lloyd is that water in itself is as necessary as sunlight and warmth in the formation of carbohydrates by plants. It is not the purpose, however, to attempt to apply this principle to all plants, for

it was noted that mays often showed a striking development during periods when transpiration exceeded absorption (Plate XII and Table XV). Of course, in this case, water stored by the plant may have been used for metabolic processes, for the deficit between absorption and transpiration never resulted in wilting.

It would seem, perhaps, that the lack of correlation between the excess of transpiration (over absorption) and the poor development of plants at temperatures above 20°C. when the humidity is 75 percent. negates the arguments which have been made. This, however, is not the case, for at 30°C. wilting (increase of transpiration over absorption) seldom took place until the day following the experiment and the return of the plant to its original environment. Likewise the yellowing of the old leaves of plants in the older developmental phase seldom occurred at 25°C. until after the plants had been returned to their original environment. It is only necessary, in these cases, to recognize the fact that at low intensities effects may not follow until a considerable time after the withdrawal of the stimulus. It should further be mentioned that young plants which had been exposed to temperatures of 25°C. and 30°C. and relative humidity of 75 percent. showed no injurious after effects if kept under the constant conditions of the growing-house; while old plants, under similar conditions, showed a yellowing of leaves. At 35°C. and relative humidity 45 percent. plants in the young phase wilted either on or following the day of the experiment. Young plants grown at 30°C. and at 45 or 75 percent. relative humidity,

and older plants grown at 30°C. and 75 percent. relative humidity showed no wilting on or following the day of the experiment unless subjected to intense sunlight. Old plants at 30°C. and relative humidity 45 percent. often became slightly flaccid near the end of a given experiment. At a relative humidity of 75 percent. and a temperature of 35°C., young plants showed no wilting during an experiment while old ones wilted badly. However, the young plants grown under these conditions wilted rhythmically near mid-day for several days under the conditions of the growing-house. Untreated plants showed no such wilting.

A comparison made between the curves of transpiration and absorption with the observed physical effects of wilting shows another marked difference between the two developmental phases of Phaseolus studied. In the tables given, the point at which the plant was observed to wilt is twice underscored; the point at which it shows recovery is once underscored. All these tables show that the deficit between transpiration and absorption which results in initial wilting is much less in the older developmental phases than in the younger. The results of the experiments, however, are not strictly comparable with each other for in some cases circumstances pervented the taking of a reading at the exact moment when the plant was placed in the experimental chamber, and, consequently, the plant may have lost some water before the first reading was made. These tables further show that wilting may show no direct relation to the periodic factor involved, but may occur at night after the periodic factor (light) is no longer acting (Tables VI, VII, IX, XVI, XXI).

It is also well, at this point, to again point out that at some temperature intensities a flaccidity of the plants under observation occurred only in the early morning of the second day of the experiment, sometimes before the periodic stimulus of light had again acted. This indicates that wilting is dependent upon internal as well as external factors.

These observations emphàsize the fact that wilting is dependent upon a complexity of factors -- internal and external. Thus it has been seen that wilting may occur even when an excess of water is supplied to the plant; that it may be conditioned by the physiological state of the plant; that it may be dependent upon the previous environment of the plant; and, that it may be more or less affected by internal factors. Such factors as these have been entirely neglected by many workers in this field (Briggs and Shantz, 1912).

In Table XXVII is given a quantitative summary of the effects of temperature and humidity upon the rate of transpiration. Livingston (1913) has suggested that seemingly pure physical processes may follow the van't Hoff-Arrhenius law which, broadly stated, demands that every increase of 10°C. result in a doubling or trebling of the rate of chemical reaction. Livingston states that his reason for this is that many physical and physiological reactions depend for their inception upon a multitude of chemical processes going on within the plant. That temperature changes do produce, within limits, differences in the rate of reaction of certain metabolic processes and follow some-

what closely van't Hoff's law has been made common knowledge through the work of Blackman (1905), Matthaei (1904), Clausen (1890), Cohen (1901), Price (1909-10), Maltaux (1906), Snyder (1908), Lehenbauer (1914), and others. Most of this work is well summarized in articles by Livingston (1913), Blackman (1908), Loeb (1908), and Snyder.

The temperature coefficients for transpiration for each rise of 10°C., calculated from Table XXVII, are as follows:-

Relative Humidity 45 percent.

Young Plants.

15°C.- 25°C.,	1.16
20°C.- 30°C.,	1.96
25°C.- 35°C.,	2.44

Old Plants.

15°C.- 25°C.,	1.31
20°C.- 30°C.,	1.34
25°C.- 35°C.,	3.10

Relative Humidity 75 percent.

Young Plants.

15°C.- 25°C.,	1.47
20°C.- 30°C.,	1.30
25°C.- 35°C.,	3.56

Old Plants.

15°C.- 25°C.,	1.15
20°C.- 30°C.,	1.23
25°C.- 35°C.,	5.06

The coefficients showing the increase in pressure of water vapour for 10°C. intervals are: -

15°C.- 25°C.,	1.84
20°C.- 30°C.,	1.80
25°C.- 35°C.,	1.77

From this data it is seen that between 15°C. and 30°C. the temperature coefficients for transpiration of plants in different stages of development grown under different conditions of humidity (45 and 75 percent.) are fairly constant for the respective conditions of growth, except in the case of young

plants grown at a relative humidity of 45 percent. With this one exception, the temperature coefficients for transpiration lie below the very lowest coefficient (1.5) ever found to apply to changes in rate of chemical action under van't Hoff's law. Likewise these coefficients are always less than the coefficients of increase for corresponding temperature changes in pressure of vapour tension. This lesser magnitude of the coefficient may be assigned to the independent physiological reaction of stomata to stimulation and a consequent slowing down in the escape of water vapour. The temperature coefficient for transpiration of all plants, grown between 25°C. and 35°C. and at both humidities and further, that of young plants between 20°C. and 30°C. at a humidity of 45 percent., shows a very sudden increase as contrasted with the coefficient for changes in pressure of vapour tension for corresponding temperature changes. This appears, at first glance, a seeming impossibility. One might think of an accumulation within the leaf of vapour under pressure and of its sudden release through the opening of the stomata at high temperatures (30°c., 35°C.). This, however, while it would account for a sudden rise in the temperature coefficient if a short interval of time only were considered, cannot be considered when the coefficient is derived from calculations based upon the total amount of water given off in twenty-four hours.

In seeking for an explanation of this sudden rise in the temperature coefficient for transpiration at temperatures between 25°C. and 35°C., it is necessary once more to recall

the conditions of plants grown between 25°C. and 35°C. It will be recalled that at temperatures above 30°C., absorption always exceeded transpiration and that wilting always occurred during or following the time of experimentation. Keeping this point in mind, one should make a careful study of Table XXVII and of the coefficients given on page 24. This will show, with the one exception previously noted (young plants at 30°C. and relative humidity 45 percent.), that the sudden increase in magnitude of the temperature coefficient for transpiration between 25°C. and 35°C. occurs not at 25°C. nor at 30°C., but at some temperature between 30°C. and 35°C.

Keeping the facts mentioned in the above paragraph well in mind, one should remember that at low evaporating intensities the leaf is partially or entirely injected with water. Consequently the evaporating surface may be considered to vary from the area of the stomata on one hand, to the area of the water surface within the leaf plus all plant membranes bordering the intercellular spaces. As long as an increasing intensity does not result in a big enough drop in the water content of the leaf to expose much of the internal membranes, every rise of 10°C. will have the same temperature coefficient, but whenever a factor becomes intense enough to cause a great loss in leaf water, more internal surface is exposed, and, consequently, the increase is due not to a sudden increase in the evolution of vapour from the leaf area taken as a unit, but from an area which may be many times larger; i.e., the free internal surfaces.

Again, at medium temperatures, the evaporating surface may be greatly reduced because of "physiologically dry" membranes. That is, the cell membranes may hold water very tenaciously while in a good "tonic" condition. High temperatures, however, influence the general "tone" of the plant and cause the membranes to become more permeable (Lepeschkin, 1908, '09, Rysselberge, 1901). Thus through a change in permeability, water might appear on the membranes which before had been "physiologically dry". Indirect evidence is good that this is true for the young plants (previously noted as an exception) whose temperature coefficient for transpiration is 1.96 for temperatures between 20°C. and 30°C. at 45 percent. relative humidity; for, at 30°C. torsions and movements of leaves (having no relation whatsoever to the usual photeolic ones) occurred, thus indicating changes in turgor relations.

A further study of the temperature coefficients for transpiration, shows that the sudden increase in magnitude at high temperatures is greatest in old plants. This is in harmony with the observations previously made, namely, -- plants in the older developmental phase are more susceptible to injury than are those in the younger phase. The sudden increase in the coefficient is also greater at high relative humidities than at low ones. This can be explained by assuming that plants exposed to temperatures somewhat below the maximum are more injuriously affected at high than at medium relative humidities, and accordingly show increased permeability. Indeed, it was an observed fact

that plants grown at 35°C. and 45 percent. relative humidity were no more permanently injured than those grown at 75 percent. relative humidity.

Table XXVII should not be passed by without noting that at relative humidities of 75 percent. transpiration, from a given unit area, is always less in old plants than in younger ones (7 - 10 days younger). This might be construed as confirmation of the belief held since the time of Hoehnel (1877) that young leaves lose more water than do old ones. It must be remembered, however, that about one-third of the leaf surface of the older plants consists of young leaflets. Further, no constant relationship holds for the amount of water lost per unit area by young and old plants grown at 45 percent. relative humidity. This indicates that the check in transpiration noted in old leaves is as much due to a physiological response to environment as to the thickening of epidermal and cuticular walls.

A further fact, which might be of value in making interpretations of the results given in Table XXVII, is that the stomata of plants in the older developmental phase, especially those grown at low relative humidities, showed very little response to temperature changes at 25°C. and below, but at 30°C. opened widely.

It may be well, at this point, to say that the porous cup evaporimeter was used in all experiments and a record of the readings kept. It was found, through actual tests, that the porous clay cup, used as an evaporimeter, is not an instrument

of precision. Such an evaporimeter exposed to low evaporating conditions, then very high ones, and again brought back to low ones, showed wide variations for which it was impossible to apply the usual coefficients of corrections. Likewise it was found impractical to use a newly corrected instrument for each experiment. Growth of fungi occurred on the cups, even if previously sterilized, and since the conditions of the experiment made it impossible to open the plant chambers to clean the evaporimeters, considerable error was introduced. The evaporimeter did, however, serve a useful purpose as a fairly good indicator of the uniformity of conditions during a given experiment.

V.

Summary.

The physiological state of the plant must be considered in experiments dealing with transpiration and absorption.

The deficit between transpiration and absorption which results in wilting is much less in plants with two full grown simple leaves and one full grown trifoliate leaf than in plants having two completely developed simple leaves.

Transpiration markedly exceeds absorption in the early forenoon of a fairly hot summer's day and falls below it in the early afternoon. The excess of water held by the plant is absorbed at this time rather than at night.

The indirect effect of external factors upon internal ones must always be considered in experiments upon wilting and transpiration.

A rhythmic wilting may be induced in Phaseolus.

While wilting at mid-day may be due to an increasing intensity of a combination of physical factors (light, temperature, humidity, air currents), it is more often due to the continued exposure to a supra-normal factor which remains constant throughout a considerable period. Many interpretations of correlations between periodic factors and transpiration, such as Briggs and Shantz (1916) have made, are open to serious objections.

Similar periodic factors affect differently the day and night transpiration of different plant species, and the

value of these factors varies greatly in different stages of plant growth.

The amount of water lost through transpiration by a given unit area of an old plant may fall or rise above that of a young plant, depending upon the environmental conditions.

The temperature coefficients expressing the relation between rising temperature and rate of transpiration lie within well defined limits for low and medium temperatures, but increase abruptly for higher temperatures. They are further modified by humidity.

The rate of transpiration at the end of twenty-four hours is often increased over the initial rate at medium temperatures, and reduced at high temperatures.

Periodicity in transpiration is determined by physiological states of growth and external conditions.

Periodicity in transpiration may be overcome.

The stomata of plants grown for twenty-four hours in an atmosphere of 75 percent. relative humidity show no particular response to temperature changes between 15°C. and 25°C. At temperatures above 25°C. an opening of the stomata occurs.

Contrary to general opinion, relative humidity may, under some conditions (temperature), be the factor governing stomatal activity.

The sudden increase in transpiration at high temperatures is due to the absence of water in the intercellular spaces of the leaf, thereby enlarging the evaporating surface through the

exposure of the internal membranes.

Acknowledgment.

In conclusion it gives pleasure to acknowledge my indebtedness to Professor Charles F. Hottes for his constant advice and aid upon various phases of the subject.

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Explanation of Tables and Plates

In the following tables the hour of the day appears upon the first horizontal line. The increments of absorption appear upon the second, and the increments of transpiration appear upon the third, each placed under its proper time interval. In case the increments are too many to be placed on one line, they are carried below under their proper time interval (of course twenty-four hours removed). In those instances where all conditions were not controlled, evaporimeter, temperature, or other records appear on other lines, separated by a blank from the rest of the table. Each experiment is listed serially under each table. Since plants in both the young and old developmental phases were usually tested together in a single experiment, the serial number representing the number of the experiment is followed by the letter "a" or "b". The letter "a" always signifies that the increments represent those of young plants, while the letter "b" represents increments of old plants. Thus Table XXIV 1a, 1b would denote that the first serial experiment of that table consisted of tests made upon young plants "1a" and old plants "1b" grown together in the same plant chamber.

The curves are plotted from the increments given in the table referred to under each plate heading. The time of day is designated at hourly intervals upon the abscissa; the amount of water absorbed and transpired is indicated in tenths of grams upon the ordinate. Curves of evaporation, absorption, and transpiration are indicated as follows: -

dashed line ―――― ―――― water loss from evaporimeter,
broken line - - - - - - - - transpiration,
solid line ―――――――― absorption.

T A B L E S

and

P L A T E S.

wn Under Normal Conditions.

	P.										A.M.		
A	4:	:16	4:16	5:16	6:16	7:16	8:16	9:16	10:16	11:16	12:16	1:16	2:16
B	.	.74	1.53	1.41	1.14	1.39	.55	.29	.30	.20	.10	.24	.10
A													
B													
C	.	.70	1.30	1.20	1.16	.33	.15	.20	.10	.10	.10	.15	.15
C													
D		.58	1.21	1.15	1.38	.63	.60	.45					
E	31	3.5	32.5	32.0	31.0	28.5	28.0	26.5	26.0	2.55	25.0	25.0	2.45
E													
F		1.0	58.0	58.5	6.75	74.0	77.0	77.5	80.0	80.0	75.0	73.0	83.5
F													

Under Normal Conditions.

	P.		P.M.								
A	1:	0	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30
B	.	7	1.90	2.27	2.25	2.71	1.63	1.31	.88	.52	.36
C	.	1	2.50	2.50	1.85	1.40	1.25	.85	.35	.15	.10
D		8	1.22	1.90	1.05	1.95	1.24	1.10	.78	.97	.49
E	32		35.0	35.0	33.5	32.0	31.0	29.5	28.0	26.5	25.0

TABLE I.

Increments of Absorption and Transpiration for Phaseolus Grown Under Normal Conditions.

A - Time
B - Increment of Absorption
C - Increment of Transpiration
D - Increment of Evaporation
E - Temperature
F - Relative Humidity

A	P.M. 4:16	5:16	6:16	7:16	8:16	9:16	8 hrs.	A.M. 5:16	6:16	7:16	8:16	9:16	10:16	11:16	P.M. 12:16	1:16	2:16	3:16	4:16	5:16	6:16	7:16	8:16	9:16	10:16	11:16	A.M. 12:16	1:16	2:16
B	.00	1.53	1.08	.58	.31	.31	(8hrs.	1.05)	.05	.08	.01	.41	.85	1.08	1.39	1.36	1.58	1.74	1.53	1.41	1.14	1.39	.55	.29	.30	.20	.10	.24	.10
A						3:16	4:16																						
B						.25	.20	.19	.11	.14	.21	.12	.24	.95															
C	.00	1.20	.70	.30	.10	.30	(8hrs.	.50)	.10	.15	.30	.80	1.25	1.50	1.55	1.70	1.80	1.70	1.30	1.20	1.16	.33	.15	.20	.10	.10	.10	.15	.15
C						.10	.06	.03	.20	.10	.20	.75	1.00	1.30															
D										.08	.24	.48	. 76	1.41	.62	1.26	1.03	1.58	1.21	1.15	1.38	.63	.60	.45					
E	31.5	30.5	29.5	28.0	26.5	26.0			23.5	23.5	24.0	26.5	28.5	30.5	31.5	32.0	33.0	33.5	32.5	32.0	31.0	28.5	28.0	26.5	26.0	2.55	25.0	25.0	2.45
E						24.5	23.5	23.0	22.0	22.0	21.5	23.5	26.0	28.5															
F													65	62	58.5	54.5	54.5	51.0	58.0	58.5	6.75	74.0	77.0	77.5	80.0	80.0	75.0	73.0	83.5
F						87.0	84.0	86.5	88.0	79.0	70.0	66.0	58.0	84.0															

TABLE II.

Increments of Absorption and Transpiration of Phaseolus Grown Under Normal Conditions.

A	P.M. 1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30		A.M. 4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	P.M. 12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30
B	.00	2.39	1.92	1.63	1.35	.80	.26	.24	.23	(7 hrs.	.98)	.11	.06	.09	.04	.31	1.70	1.57	1.90	2.27	2.25	2.71	1.63	1.31	.88	.52	.36
C	.00	2.55	1.58	1.92	1.10	.55	.10	.05	.05	(7 hrs.	.44)	.11	.07	.27	.60	1.38	1.51	2.11	2.50	2.50	1.85	1.40	1.25	.85	.35	.15	.10
D																.47	1.07	.88	1.22	1.90	1.05	1.95	1.24	1.10	.78	.97	.49
E	32.0	31.0	30.0	29.0	28.0	27.0	25.0	25.0	24.0		22.0	22.0	22.5	24.0	27.0	30.0	31.0	34.0	35.0	35.0	33.5	32.0	31.0	29.5	28.0	26.5	25.0

Normal Conditions.

A - 1	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
	.10	.85	1.88	1.78	2.03	1.59	1.30	.90	.74	.57	.35	.29
	.55	1.65	2.25	1.85	1.95	1.60	1.05	.35	.45	.25	.20	.20
	.23	.35	1.55	1.55	1.17	1.58	.98	.85	.94	.65	.48	.50
	24.5	27.5	27.5	28.0	27.5	27.0	26.0	26.0	23.5	22.5	22.0	21.0
	58.5	50.0	49.5	46.0	51.0	53.0	60.0	64.0	66.5	72.0	74.5	77.0

Normal Conditions.

P.M. 3:1	2:16	3:16	4:16	5:16	6:16	7:16	8:16	9:16	10:16	11:16	A.M. 12:16	1:16	2:16
.0	1.05	1.33	1.04	1.22	1.30	.53	.76	.34	.35	.20	.24	.24	.29
.0	1.03	1.36	1.30	1.05	1.10	.45	.20	.20	.20	.07	.05	.10	.10
(E) .	32.5	31.5	31.0	30.0	28.5	28.0	26.0	25.5	25.0	25.0	24.5	24.0	23.0
	54.0	51.0	58.0	58.5	67.5	74.0	77.0	77.5	80.0	80.0	75.0	73.0	83.5

TABLE III.

Increments of Absorption and Transpiration of Phaseolus Grown Under Normal Conditions.

A - Time
B - Increment of Absorption
C - Increment of Transpiration
D - Increment of Evaporation
E - Temperature
F - Relative Humidity

	A.M.	P.M.											A.M.
A -	11:45	12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	(7 hrs. 10:45	4:45)
B	.00	.36	.42	1.00	.63	.63	.28	.38	.34	.33	.25 .46	(7 hrs. .20	1.45)
C	.00	.55	.90	.90	.40	.40	.25	.50	.15	.05	.05 .10	(7 hrs. .10	.65)
D	.00	.36	.39	.74	.60	.54	.46	.50	.31	.40	.31 .30	(7 hrs. .25	1.51)
E	22.0	23.5	25.0	24.0	23.5	22.5	22.0	21.0	20.5	19.5	19.0 21.5	21.0	15.5
F	73.0	71.0	62.5	67.0	73.0	79.0	78.0	79.0	79.0	80.0	85.0 77.0	78.0	83.0

								P.M.								
A -	5:45	6:45	7:45	8:45	9:45	10:45	11:45	12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
B	.11	.06	.09	1.40	.10	.85	1.88	1.78	2.03	1.59	1.30	.90	.74	.57	.35	.29
C	.00	.00	.15	.50	.55	1.65	2.25	1.85	1.95	1.60	1.05	.35	.45	.25	.20	.20
D	.15	.05	.14	.16	.23	.35	1.55	1.55	1.17	1.58	.98	.85	.94	.65	.48	.50
E	15.5	16.0	18.0	22.0	24.5	27.5	27.5	28.0	27.5	27.0	26.0	26.0	23.5	22.5	22.0	21.0
F	85.5	83.5	77.5	64.5	58.5	50.0	49.5	46.0	51.0	53.0	60.0	64.0	66.5	72.0	74.5	77.0

TABLE IV.

Increments of Absorption and Transpiration for Mays Grown Under Normal Conditions.

	P.M.									A.M.						
A	3:16	4:16	5:16	6:16	7:16	8:16	9:16	(8 hrs. 3:16	4:16	5:16)	6:16	7:16	8:16	9:16	10:16	11:16
B	.00	1.31	1.08	.87	.65	.50	.37	(8 hrs. .21	.34	.79) .15	.14 .24	.11 .13	.13 .24	.15 .07	.92 .12	.42 .25
C	.00	1.26	1.00	.60	.30	.40	.10	(8 hrs. .10	.10	1.00) .05	.17 .15	.12 .10	.45 .33	.35 .40	1.13 .76	.63 .90
D	(Evaporimeter the same as in Table I)															
E	.23	31.5	30.5	29.5	28.0	26.5	26.0	23.0	22.5	26.0 22.0	23.5 21.0	24.0 21.5	26.5 23.5	28.5 26.5	30.5 29.0	31.5 31.0
F								83.5	87.0	84.0	86.5	88.0	79.0	70.0	65.0 66.0	62.0 58.0

	P.M.												A.M.		
A	12:16	1:16	2:16	3:16	4:16	5:16	6:16	7:16	8:16	9:16	10:16	11:16	12:16	1:16	2:16
B	.49	1.18	1.05	1.33	1.04	1.22	1.30	.53	.76	.34	.35	.20	.24	.24	.29
C	1.03	1.30	1.03	1.36	1.30	1.05	1.10	.45	.20	.20	.20	.07	.05	.10	.10
D															23.0
E	32.0	32.0	32.5	31.5	31.0	30.0	28.5	28.0	26.0	25.5	25.0	25.0	24.5	24.0	83.5
F	58.5	54.5	54.0	51.0	58.0	58.5	67.5	74.0	77.0	77.5	80.0	80.0	75.0	73.0	

er Normal Conditions.

	A.M. 11:45	45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45
B	.00	07	.10	.45	.52	.57	.88	.71	.66	.68	.48	.14	.33	.10
C	.00	35	.55	.85	.55	.70	.75	.50	.50	.35	.30	.15	.05	.10
D	.00	23	.35	1.55	1.55	1.17	1.58	.98	.85	.94	.65	.48	.50	.30
E	22.0	.5	27.5	27.5	28.0	27.5	27.0	21.0	26.0	23.5	22.5	22.0	21.0	21.5
F	73.0	.5	50.0	49.5	46.0	51.0	53.0	60.0	66.5	72.0	79.5	77.0	77.0	78.0

Inc ve Humidity Under Bright Diffuse Daylight During the Day Period.

	A.M. 8:00	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45
B		.35	.60	1.10	1.10	1.20	1.40	1.50	1.85	1.95	2.20
C		.75	.50	1.10	1.15	1.25	1.60	2.50	1.80	2.10	1.70
B		1.50	1.45	1.35	1.40	1.70	1.60	1.70	1.80	2.00	1.90
C		1.35	1.45	1.65	1.55	1.60	1.65	1.45	1.80	2.20	2.25
D		1.65	1.70	1.70	1.70	1.60	1.50	1.70	1.50	1.65	1.65

TABLE V.

Increments of Absorption and Transpiration of Mays Grown Under Normal Conditions.

A - Time
B - Increment of Absorption
C - Increment of Transpiration
D - Increment of Evaporation
E - Temperature
F - Relative Humidity.

A	A.M. 11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	(7 hrs. 10:45	A.M. 4:45)	5:45	6:45	7:45	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45
B	.00	.03	.03	.39	.38	.43	.10	.41	.23	.16	.13	(7 hrs. .16	.87)	.16	.00	.05	.06	.07	.10	.45	.52	.57	.88	.71	.66	.68	.48	.14	.33	.10
C	.00	.10	.30	.35	.30	.15	.15	.15	.05	.10	.05	(7 hrs. .10	.40)	.00	.00	.10	.25	.35	.55	.85	.55	.70	.75	.50	.50	.35	.30	.15	.05	.10
D	.00	.36	.39	.74	.60	.54	.46	.50	.31	.40	.31	(7 hrs. .25	1.51)	.15	.05	.14	.16	.23	.35	1.55	1.55	1.17	1.58	.98	.85	.94	.65	.48	.50	.30
E	22.0	23.5	25.0	24.0	23.5	22.5	22.0	21.0	20.5	19.5	19.0	21.0	15.5)	15.5	16.0	18.0	22.0	24.5	27.5	27.5	28.0	27.5	27.0	21.0	26.0	23.5	22.5	22.0	21.0	21.5
F	73.0	71.0	62.5	67.0	73.0	79.0	78.0	79.0	79.0	80.0	85.0	71.0	83.0	85.5	83.5	77.5	64.5	58.5	50.0	49.5	46.0	51.0	53.0	60.0	66.5	72.0	79.5	77.0	77.0	78.0

TABLE VI.

Increments of Absorption and Transpiration for Phaseolus Grown at 35°C. and 45 Percent. Relative Humidity Under Bright Diffuse Daylight During the Day Period.

A	A.M. 8:00	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45
															1a.													
B		.55	1.75	2.40	2.20	2.45	2.50	2.25	2.25	1.50	1.30	.35	.45	.90	.60	.85	.45	1.00	.35	.60	1.10	1.10	1.20	1.40	1.50	1.85	1.95	2.20
C		1.75	2.00	2.35	2.35	2.15	2.53	2.30	1.85	1.40	.80	.75	.65	.75	.70	.40	.55	.75	.75	.50	1.10	1.15	1.25	1.60	2.50	1.80	2.10	1.70
															1b.													
B		.30	1.15	2.30	2.15	2.10	2.10	2.05	1.95	1.80	1.60	1.45	1.35	1.45	1.35	1.50	1.50	1.50	1.50	1.45	1.35	1.40	1.70	1.60	1.70	1.80	2.00	1.90
C		.55	2.00	2.55	2.00	2.05	2.00	2.05	2.05	1.25	1.70	1.30	1.425	1.38	1.30	1.43	1.50	1.45	1.35	1.45	1.65	1.55	1.60	1.65	1.45	1.80	2.20	2.25
D		.85	1.15	1.70	1.45	1.60	1.63	1.55	1.70	1.60	1.60	1.50	1.50	1.55	1.50	1.60	1.55	1.63	1.65	1.70	1.70	1.70	1.60	1.50	1.70	1.50	1.65	1.65

Incr e Humidity Under Bright Diffuse Daylight During the Day Period.

	A.M. 8:10	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
B		.50	.55	.30	.30	.60	.55	.55	.60
C		.50	.30	.45	.50	.55	.65	.55	.55
B		1.90	1.47	1.60	1.60	1.65	1.65	1.50	1.35
C		1.80	1.80	1.90	1.90	1.75	1.60	1.40	1.55
D		1.20	1.35	1.50	1.50	1.50	1.45	1.40	1.35

Incre Humidity under Bright Diffuse Daylight During the Day Peridd.

	A.M. 5:55	:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
B	.00	.85	1.85	2.50	2.75	2.50	2.80	2.70	2.80	2.70	2.50	
C		.60	2.60	2.65	2.50	2.70	2.80	2.70	2.70	2.80	2.50	
B		.10	1.30	1.65	1.85	1.70	1.90	1.90	1.80	1.35	1.70	
C		.85	1.55	1.60	1.60	1.80	1.90	1.90	2.00	1.65	2.00	

TABLE VII.

Increments of Absorption and Transpiration for Phaseolus Grown at 35°C. and 45 Percent. Relative Humidity Under Bright Diffuse Daylight During the Day Period.

A - Time
B - Increment of Absorption
C- Increment of Transpiration
D - Increment of Evaporation

A	A.M. 8:10	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
1a.																										
B		.25	1.35	1.60	1.55	1.80	2.05	1.60	1.35	.65	.70	.80	.60	.65	.90	.55	.30	.50	.50	.55	.30	.30	.60	.55	.55	.60
C		.70	1.45	1.80	1.60	1.85	1.90	1.75	1.15	.75	.70	.70	.80	.75	.45	.55	.45	.35	.50	.30	.45	.50	.55	.65	.55	.55
1b.																										
B		.65	2.35	2.45	2.75	2.90	3.10	3.20	2.85	2.70	2.55	2.60	2.55	2.65	2.60	1.50	2.20	1.95	1.90	1.47	1.60	1.60	1.65	1.65	1.50	1.35
C		.70	2.40	2.75	2.80	2.75	3.25	3.00	2.55	2.65	2.55	2.55	2.60	2.70	1.60	1.95	2.10	1.70	1.80	1.80	1.90	1.90	1.75	1.60	1.40	1.55
D			1.20	1.55	1.30	1.35	1.40	1.35	1.40	1.45	1.35	1.50	1.45	1.45	1.35	1.45	1.35	1.40	1.20	1.35	1.50	1.50	1.50	1.45	1.40	1.35

TABLE VIII.

Increments of Absorption and Transpiration for Phaseolus Grown at 35°C. and 45 Percent. Relative Humidity under Bright Diffuse Daylight During the Day Peridd.

A	A.M. 5:55	6:30	6:45	7:45	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
1b.																													
B	.00	.50	.13	1.85	2.70	2.55	2.95	3.05	3.50	3.35	3.25	3.05	3.05	2.80	2.75	2.70	2.80	2.25	1.85	1.85	2.50	2.75	2.50	2.80	2.70	2.80	2.70	2.50	
C		.40	.45	2.35	2.80	2.80	2.60	3.30	3.50	2.80	3.40	3.10	2.65	2.70	2.75	2.45	2.70	2.25	1.60	2.60	2.65	2.50	2.70	2.80	2.70	2.70	2.80	2.50	
2b.																													
B				1.40	1.90	2.00	2.00	2.00	2.40	2.45	2.25	2.15	2.15	1.80	1.80	1.75	1.85	1.60	1.10	1.30	1.65	1.85	1.70	1.90	1.90	1.80	1.35	1.70	
C				1.40	2.05	2.05	1.65	2.15	2.45	2.30	2.00	2.20	2.00	1.70	1.85	1.50	1.80	1.40	.85	1.55	1.60	1.60	1.80	1.90	1.90	2.00	1.65	2.00	

Incre Humidity Under Bright Diffuse Daylight During the Day Period.

	A.M.			A.M.						
A	5:15	:53	11:53	12:53	1:53	2:53	3:53	4:53	5:53	6:53
B	.00	.60	1.45	1.45	1.20	1.10	1.10	1.30	1.20	1.20
C	.00	.65	1.10	1.50	1.20	1.20	1.15	1.35	1.20	1.15
B		.85	1.10	1.20	.60	.55	.85	.95	1.00	1.10
C		.90	.90	.90	.60	.90	.70	1.25	.85	1.10
D		70								

Incre Humidity Under Bright Diffuse Daylight During the Day Period.

	AM.	.M.								
A	7:20	12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
B		.35	.40	.35	.55	.30	.35	.40	.25	.45
C	.00	.40	.35	.45	.40	.30	.40	.30	.35	.40
B		.85	.90	.95	.90	1.05	.90	1.00	1.05	1.90
C		1.00	.90	.85	1.05	.95	.95	1.05	1.00	1.00
D		1.15	1.05	1.10	1.05	1.05	1.05	1.00	1.00	1.10

TABLE IX.

Increments of Absorption and Transpiration for Phaseolus Grown at 35°C. and 45 Percent. Relative Humidity Under Bright Diffuse Daylight During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration
D - Increment of Evaporation

1a.

A	A.M. 5:15	5:53	6:53	7:53	8:53	9:53	10:53	11:53	P.M. 12:53	1:53	2:53	3:53	4:53	5:53	6:53	7:53	8:53	9:53	10:53	11:53	A.M. 12:53	1:53	2:53	3:53	4:53	5:53	6:53
B	.00	.20	.70	2.10	1.70	1.40	1.10	1.50	1.35	1.75	1.50	1.80	1.65	1.60	1.60	1.65	1.50	1.55	1.60	1.45	1.45	1.20	1.10	1.10	1.30	1.20	1.20
C	.00	.30	1.10	2.30	2.10	1.50	1.30	1.20	1.20	1.45	1.50	1.80	1.65	1.55	1.65	1.60	2.00	1.55	1.65	1.10	1.50	1.20	1.20	1.15	1.35	1.20	1.15

1b.

A	A.M. 5:15	5:53	6:53	7:53	8:53	9:53	10:53	11:53	P.M. 12:53	1:53	2:53	3:53	4:53	5:53	6:53	7:53	8:53	9:53	10:53	11:53	A.M. 12:53	1:53	2:53	3:53	4:53	5:53	6:53
B		.00	.40	1.50	1.35	.95	1.80	.80	.85	.90	.90	1.00	.90	.80	.80	.80	.85	.95	.85	1.10	1.20	.60	.55	.85	.95	1.00	1.10
C		.00	1.25	1.60	1.95	1.20	.90	.80	.80	.70	.80	.95	.85	.90	.70	.80	1.00	1.00	.90	.90	.90	.60	.90	.70	1.25	.85	1.10
D		.00	1.45	1.50	1.75	1.85	1.70	1.90	1.70	1.60	1.60	1.75	1.65	1.60	1.60	1.60	1.60	1.75	1.70								

TABLE X.

Increments of Absorption and Transpiration for Phaseolus Grown at 25°C. and 45 Percent. Relative Humidity Under Bright Diffuse Daylight During the Day Period.

1a.

A	AM. 7:20	8:00	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
B		.15	.35	.55	.80	.80	.80	.80	.60	.80	.60	.30	.45	.55	.35	.45	.55	.40	.35	.40	.35	.55	.30	.35	.40	.25	.45
C	.00		.40	.65	.70	1.05	.65	.75	.70	.75	.60	.55	.45	.40	.50	.40	.45	.35	.40	.35	.45	.40	.30	.40	.30	.35	.40

1b.

A	AM. 7:20	8:00	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
B		.00	.65	1.05	1.10	1.20	1.10	.95	1.05	1.00	.95	.80	.95	.95	.85	.90	.90	.95	.85	.90	.95	.90	1.05	.90	1.00	1.05	1.90
C		.00	.65	1.25	1.05	1.20	.90	1.30	.85	.95	.95	.65	.95	.85	1.00	.70	.95	.95	1.00	.90	.85	1.05	.95	.95	1.05	1.00	1.00
D			.80	1.00	1.00	.80	.90	1.05	1.10	1.15	1.10	1.05	1.15	1.05	1.10	1.10	1.00	1.10	1.15	1.05	1.10	1.05	1.05	1.05	1.00	1.00	1.10

Increm Humidity Under Bright Diffuse Daylight During the Day Period.

	A.M. 7:58	.M. 2:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45
B		.30	.15	.20	.15	.20	.25	.15	.20	.30	.65
C		.15	.20	.15	.15	.20	.15	.20	.15	.45	.65
B		.70	.60	.85	.45	.70	.55	.60	.70	.65	.75
C		.60	.65	.95	.50	.50	.80	.60	.40	.75	1.00
D		1.10	1.10	1.05	1.10	1.10	1.05	1.10	1.05	1.00	1.00

Increm umidity Under Bright Diffuse Daylight During the Day Period.

	A.M. 6:29	:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
B	.00	.15	.15	.25	.20	.20	.20	.20	.20	.20	.20
C		.20	.25	.15	.20	.20	.20	.15	.25	.15	.20
B		.45	.45	.30	.40	.40	.50	.35	.45	.45	.35
C		.40	.35	.45	.35	.45	.40	.40	.35	.45	.40
D	.00	.70	.70	.75	.75	.70	.70	.70	.70	.75	.70

T A B L E X I .

Increments of Absorption and Transpiration for Phaseolus Grown at 25°C. and 45 Percent. Relative Humidity Under Bright Diffuse Daylight During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration
D - Increment of Evaporation

A	A.M. 7:58	8:24	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45
1a.														
B			.40	.55	.65	.85	.85	.75	.50	.50	.25	.30	.30	.30
C				.60	.75	.85	.95	.85	.45	.50	.30	.25	.20	.30
1b.														
B		.00	.15	.55	.75	1.05	1.15	.90	.85	.85	.80	.75	.70	.75
C		.00	.25	.65	1.00	1.05	1.15	1.05	.80	.95	.80	.75	.60	.75
D			.00	1.15	1.10	1.05	.95	.85	.95	1.05	1.15	1.10	1.05	1.20

A	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45
1a.														
B	.20	.30	. 20	.20	.30	.15	.20	.15	.20	.25	.15	.20	.30	.65
C	.20	.30	.20	.20	.15	.20	.15	.15	.20	.15	.20	.15	.45	.55
1b.														
B	.75	.70	.70	.65	.70	.60	.85	.45	.70	.55	.60	.70	.65	.75
C	.55	.75	.65	.65	.60	.65	.95	.50	.50	.80	.60	.40	.75	1.00
D	1.10	1.20	1.05	1.10	1.10	1.10	1.05	1.10	1.10	1.05	1.10	1.05	1.00	1.00

T A B L E X I I.

Increments of Absorption and Transpiration for Phaseolus Grown at 20°C. and 50 Percent Relative Humidity Under Bright Diffuse Daylight During the Day Period.

A	A.M. 6:29	6:45	7:45	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45
1a.														
B	.00	.10	.15	.30	.25	.50	.40	.30	.30	.40	.25	.30	.10	.25
C			.30	.25	.25	.35	.35	.40	.30	.25	.30	.30	.25	.20
1b.														
B		.00	.00	.25	.35	.55	.60	.45	.60	.55	.45	.50	.45	.45
C			.15	.20	.55	.50	.60	.45	.60	.50	.55	.45	.50	.45
D	.00		.90	.80	.75	.70	.90	.70	.85	.70	.70	.80	.75	.80

A	7:45	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45
1a.														
B	.20	.20	.10	.25	.15	.15	.25	.20	.20	.20	.20	.20	.20	.20
C	.20	.25	.15	.15	.20	.25	.15	.20	.20	.20	.15	.25	.15	.20
1b.														
B	.45	.30	.45	.45	.45	.45	.30	.40	.40	.50	.35	.45	.45	.35
C	.40	.40	.45	.45	.40	.35	.45	.35	.45	.40	.40	.35	.45	.40
D	.65	.75	.70	.75	.70	.70	.75	.75	.70	.70	.70	.70	.75	.70

Incrdity Under Bright Diffuse Light During the Day Period.

	A.M.												P.M.
A	-7:45	1:49	2:49	3:49	4:49	5:49	6:49	7:49	8:49	9:49	10:49	11:49	12:49
B		.20	.20	.40	.25	.40	.50	.40	.45	.65	.70	.80	.75
C		.30	.10	.55	.25	.30	.40	.50	.45	.55	.80	.65	.70
B		.15	.15	.15	.10	.10	.20	.20	.25	.60	.95	1.25	1.20
C		.15	.20	.20	.20	.15	.20	.20	.55	.65	1.00	1.30	1.15

Incremdity Under Bright Diffuse Daylight During the Day Period.

	A.M.		A.M.										
A	6:25	6:45	12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45
B		.25	.20	.15	.15	.20	.20	.20	.20	.30	.40	.75	.55
C		.30	.25	.15	.20	.15	.25	.10	.15	.25	.70	.70	.60
B		.30	.30	.10	.25	.20	.45	.20	.15	.30	.70	.90	.90
C		.25	.20	.25	.20	.15	.30	.25	.20	.25	.95	.95	.90
D		.45	1.65	1.30	1.50	1.50	1.60	1.35	1.40	1.35	1.45	1.55	1.40

Incremlity Under Bright Diffuse Daylight During the Day Period.

	A.M.		A.M.							
A	6:13	6:48	12:48	1:48	2:48	3:48	4:48	5:48	6:48	7:48
B		30	.10	.25	.30	.25	.30	.25	.25	.35
C		.20	.20	.25	.20	.25	.35	.25	.20	.10
		25	.25	.20	.25	.20	.25	.20	.20	.25
		25	.25	.20	.20	.20	.20	.25	.25	.15
		50	1.55	1.60	1.55	1.55	1.55	1.60	1.50	1.75

TABLE XIII.

Increments of Absorption and Transpiration for Mays Grown at 35°C. and 45 Percent. Relative Humidity Under Bright Diffuse Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration
D - Increment of Evaporation.

A	A.M. 7:45	8:49	9:49	10:49	11:49	P.M. 12:49	1:49	2:49	3:49	4:49	5:49	6:49	7:49	8:49	9:49	10:49	11:49	A.M. 12:49	1:49	2:49	3:49	4:49	5:49	6:49	7:49	8:49	9:49	10:49	11:49	P.M. 12:49
1a.																														
B			.20	.30	.45	.50	.50	.40	.40	.35	.35	.40	.30	.65	.30	.20	.15	.35	.20	.20	.40	.25	.40	.50	.40	.45	.65	.70	.80	.75
C			.35	.30	.60	.45	.55	.40	.40	.30	.35	.45	.40	.75	.30	.20	.15	.25	.30	.10	.55	.25	.30	.40	.50	.45	.55	.80	.65	.70
1b																														
B			.55	.55	.60	1.05	1.00	.65	.60	.45	.40	.25	.30	.50	.30	.35	.20	.15	.15	.15	.15	.10	.10	.20	.20	.25	.60	.95	1.25	1.20
C			.45	.50	.90	1.15	1.05	.65	.45	.35	.30	.25	.05	.35	.14	.30	.10	.20	.15	.20	.20	.20	.15	.20	.20	.55	.65	1.00	1.30	1.15

TABLE XIV.

Increments of Absorption and Transpiration for Mays Grown at 35°C. and 45 Percent. Relative Humidity Under Bright Diffuse Daylight During the Day Period.

A	A.M. 6:25	6:45	7:45	8:45	9:45	10:45	11:45	P.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45	11:45	A.M. 12:45	1:45	2:45	3:45	4:45	5:45	6:45	7:45	8:45	9:45	10:45
1b.																														
B			.70	.70	.60	.70	.75	1.00	.75	.95	.70	.55	.50	.30	.35	.35	.25	.25	.25	.20	.15	.15	.20	.20	.20	.20	.30	.40	.75	.55
C			.70	.70	.80	.85	.92	1.05	.80	.80	.55	.45	.35	.30	.30	.15	.20	.25	.30	.25	.15	.20	.15	.25	.10	.15	.25	.70	.70	.60
2b.																														
B			.30	.70	1.00	.65	1.00	1.10	1.10	.85	.65	.50	.30	.15	.35	.20	.20	.20	.30	.30	.10	.25	.20	.45	.20	.15	.30	.70	.90	.90
C			.35	.85	.85	.80	1.20	1.05	.85	.90	.55	.50	.30	.25	.15	.15	.35	.15	.25	.20	.25	.20	.15	.30	.25	.20	.25	.95	.95	.90
D			1.25	1.40	1.30	1.45	1.65	1.40	1.50	1.45	1.30	1.50	1.35	1.35	1.45	1.55	1.45	1.50	1.45	1.65	1.30	1.50	1.50	1.60	1.35	1.40	1.35	1.45	1.55	1.40

TABLE XV.

Increments of Absorption and Transpiration for Mays Grown at 35°C. and 45 Percent. Relative Humidity Under Bright Diffuse Daylight During the Day Period.

A	A.M. 6:13	6:48	7:48	8:48	9:48	10:48	11:48	P.M. 12:48	1:48	2:48	3:48	4:48	5:48	6:48	7:48	8:48	9:48	10:48	11:48	A.M. 12:48	1:48	2:48	3:48	4:48	5:48	6:48	7:48
1a.																											
B		.05	.20	.05	.15	.25	.30	.25	.30	.40	.25	.35	.40	.50	.10	.25	.25	.30	.30	.10	.25	.30	.25	.30	.25	.25	.35
C		.15	.30	.20	.25	.25	.30	.25	.25	.35	.25	.45	.20	.35	.15	.25	.25	.20	.20	.20	.25	.20	.25	.35	.25	.20	.10
1b.																											
B			.15	.10	.50	.50	.65	.65	.70	.55	.35	.30	.35	.30	.15	.15	.35	.20	.25	.25	.20	.25	.20	.25	.20	.20	.25
C			.65	.70	.70	.55	.55	.70	.55	.55	.40	.70	.35	.25	.20	.20	.25	.20	.25	.25	.20	.20	.20	.20	.25	.25	.15
D			1.45	1.65	1.60	1.65	1.70	1.60	1.55	1.55	1.50	1.70	1.60	1.60	1.60	1.55	1.55	1.50	1.50	1.55	1.60	1.55	1.55	1.55	1.60	1.50	1.75

lative Humidity under Constant Light During the Day Period.

	A.M.		A.M.										
A	5:4	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20	8:20	9:20	10:20
B		.40	.40	.40	.50	.60	.80	.70	.80	.80	1.00	.95	
C		.45	.45	.45	.50	.85	.60	.85	.80	.95	1.00	.85	

	A.M.	A.M.									
A	6:52	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15
B		.50	.40	.40	.55	.70	.70	.85	.70	1.00	.90
C		.45	.40	.45	.55	.65	.70	.90	.90	1.05	.95
B		1.95	1.95	1.80	1.70	2.00	1.60	1.70	1.75	1.35	
C		1.90	1.85	1.80	2.00	1.90	1.80	1.75	1.75	1.65	

	A.M.		A.M.									
A	6:53	11:55	12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
B		.15	.45	.55	.55	.90	1.05	.85	.90	.90	1.00	.90
C		.50	.40	.55	.70	.95	1.00	.90	1.00	1.00	.95	1.05
B		1.70	1.65	1.50	2.45	2.25	2.45	2.10	2.60	1.70	1.70	1.80
C		1.80	1.45	1.95	2.50	2.40	2.50	2.00	2.30	2.10	1.75	1.05

	A.M.			A.M.									
A	5:4	0:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50
B		.30	.30	.30	.30	.20	.30	.40	.60	.80	.70	.70	.80
C		.50	.25	.30	.25	.30	.40	.45	.60	.75	.80	.80	.75
B													
C													
B		1.00	1.20	1.00	1.20	1.10	1.20	1.40	1.20	1.40	1.15	1.25	1.15
C		1.10	1.15	1.15	1.15	1.20	1.35	1.40	1.20	1.40	1.25	1.30	1.20
B													
C													

TABLE XVI.

Increments of Absorption and Transpiration for Phaseolus Grown at 35°C. and 45 percent. Relative Humidity under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration.

1a.

A	A.M. 5:45	6:20	7:20	8:20	9:20	10:20	11:20	P.M. 12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20	8:20	9:20	10:20	11:20	A.M. 12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20	8:20	9:20	10:20
B		.50	.90	1.15	.85	1.10	.80	1.10	1.10	1.05	.55	.70	.55	.35	.40	.35	.35	.30	.40	.40	.40	.50	.60	.80	.70	.80	.80	1.00	.95	
C		.65	1.20	1.40	1.05	1.00	.95	1.10	.85	.90	.60	.55	.45	.40	.40	.45	.35	.45	.45	.45	.45	.50	.85	.60	.85	.80	.95	1.00	.85	

2a.

A	A.M. 6:52	7:15	8:15	9:15	10:15	11:15	P.M. 12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15	10:15	11:15	A.M. 12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15
B		.20	.60	1.50	1.20	1.00	1.00	1.00	1.00	.95	.50	.60	.45	.50	.50	.50	.50	.40	.50	.40	.40	.55	.70	.70	.85	.70	1.00	.90
C		.20	.90	1.85	1.20	1.00	.90	1.10	1.00	.80	.60	.30	.55	.50	.45	.45	.50	.35	.45	.40	.45	.55	.65	.70	.90	.90	1.05	.95
2b.																												
B			.25	2.50	1.95	1.90	1.95	2.05	2.15	2.35	2.00	2.15	1.90	2.25	2.10	2.10	2.45	1.65	1.95	1.95	1.80	1.70	2.00	1.60	1.70	1.75	1.35	
C			.65	3.10	1.85	1.90	2.00	1.90	2.15	2.05	2.10	1.95	2.10	2.05	2.20	2.10	2.30	2.00	1.90	1.85	1.80	2.00	1.90	1.80	1.75	1.75	1.65	

3a.

A	A.M. 6:53	7:22	7:55	8:55	9:55	10:55	11:55	P.M. 12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55	10:55	11:55	A.M. 12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
B		.05	.45	1.10	.90	.80	.80	.70	.70	.60	.50	.60	.40	.20	.30	.60	.50	.80	.15	.45	.55	.55	.90	1.05	.85	.90	.90	1.00	.90
C		.25	.40	1.55	1.05	.90	.80	.70	.75	.60	.45	.40	.50	.35	.40	.50	.40	.50	.50	.40	.55	.70	.95	1.00	.90	1.00	1.00	.95	1.05
3b.																													
B			.15	2.20	2.15	1.85	2.15	2.45	2.00	1.70	1.50	1.20	.95	1.15	.95	1.60	1.75	1.70	1.70	1.65	1.50	2.45	2.25	2.45	2.10	2.60	1.70	1.70	1.80
C			.20	3.00	2.05	2.00	2.35	2.00	2.05	1.70	1.25	1.20	1.05	1.00	1.10	.80	2.40	1.75	1.80	1.45	1.95	2.50	2.40	2.50	2.00	2.30	2.10	1.75	1.05

4a.

A	A.M. 5:40	6:08	7:08	7:50	8:50	9:50	10:50	11:50	P.M. 12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	A.M. 12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50
B		.10	.20	.80	.80	.80	.75	.75	.60	.90	.80	.30	.30	.20	.40	.35	.25	.50	.30	.30	.30	.30	.20	.30	.40	.60	.80	.70	.70	.80
C		.30	.95	.70	1.05	.80	.85	.80	.75	.60	.60	.45	.45	.40	.35	.25	.30	.25	.50	.25	.30	.25	.30	.40	.45	.60	.75	.80	.80	.75
B							.60																							
C							.70																							
4b.																														
B		.00	.50	.45	.80	1.55	1.60	1.50	1.80	1.30	1.50	1.25	1.30	1.30	1.05	1.15	1.10	1.15	1.00	1.20	1.00	1.20	1.10	1.20	1.40	1.20	1.40	1.15	1.25	1.15
C			1.30		1.30	1.40	1.60	1.60	1.55	1.30	1.40	1.25	1.35	1.15	1.15	1.10	1.00	.95	1.10	1.15	1.15	1.15	1.20	1.35	1.40	1.20	1.40	1.25	1.30	1.20
B							1.35																							
C							1.15																							

In ve Humidity Under Constant Light During the Day Period.

	A.M.	A.M.										
A	7:12	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50
B	.00	.10	.20	.20	.15	.15	.20	.35	.10	.60	.50	.40
C	.00	.20	.20	.20	.20	.20	.20	.25	.30	.60	.35	.45
B		.75	.55	.50	.60	.65	.60	.85	1.00	1.40	1.25	1.20
C		.55	.60	.55	.60	.60	.75	.80	1.10	1.30	1.15	1.10

	A.M.			A.M.									
A	6:03	:55	11:55	12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
B	.00	.30	.40	.45	.35	.30	.35	.30	.45	.40	.70	.80	.80
C	,00	.35	.35	.35	.60	.35	.35	.35	.40	.50	.70	.80	.70
B													
C													
B		.35	.35	.60	.40	.40	.45	.60	.35	.75	.85	.85	.90
C		.55	.50	.45	.45	.50	.45	.45	.50	.75	.90	1.05	.95
B													
C													

	A.M.		A.M.										
A	5:23	1:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07
B	.00	.35	.30	.15	.30	.30	.30	.30	.45	1.05	1.45	.95	1.10
C	.00	.25	.30	.30	.30	.25	.25	.40	.50	.20	.50	.80	1.10
B													
C													
B		.75	.70	.80	.80	.75	.65	.85	.90	.95	1.25	1.05	1.45
C		.70	.75	.75	.70	.70	.75	.85	.80	.95	1.65	1.00	1.40
B													
C													

	A.M.	A.M.											
A	6:02	12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02	11:02
B	.00	.60	.30	.25	.25	.45	.25	.50	.50	1.10	1.30	1.20	1.30
C	.00	.35	.30	.30	.30	.35	.35	.45	.45	1.25	1.20	1.25	1.15
B		.35	.35	.35	.35	.25	.40	.35	.80	1.55	1.35	1.60	
C		.25	.40	.30	.25	.30	.40	.40	.75	.95	1.45	1.55	

TABLE XVII.

Increment of Absorption and Transpiration for Phaseolus Grown at 30°C. and 45 percent. Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration

1a.

	A.M.						P.M.												A.M.										
A	7:12	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50
B	.00	.10	.75	.75	.50	.70	.70	.60	.75	.50	.45	.20	.30	.15	.15	.20	.20	.25	.10	.20	.20	.15	.15	.20	.35	.10	.60	.50	.40
C	.00	.40	.75	.75	.70	.70	.65	.60	.55	.45	.30	.30	.20	.25	.10	.20	.25	.20	.20	.20	.20	.20	.20	.20	.25	.30	.60	.35	.45
1b.																													
B		.00	.60	1.00	.90	1.10	.80	1.05	.75	.60	.70	.75	.65	.60	.60	.35	.55	.60	.75	.55	.50	.60	.65	.60	.85	1.00	1.40	1.25	1.20
C		.00	.10	1.10	1.00	.95	.85	.90	.35	1.15	.65	.65	.40	.55	.50	.60	.55	.60	.55	.60	.55	.60	.60	.75	.80	1.10	1.30	1.15	1.10

2a.

	A.M.								P.M.												A.M.									
A	6:03	6:22	7:22	7:55	8:55	9:57	10:55	11:55	12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55	10:55	11:55	12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
B	.00	.05	.60	.30	.70	1.00	.80	.90	1.00	.90	.75	.70	.50	.45	.30	.30	.40	.20	.30	.40	.45	.35	.30	.35	.30	.45	.40	.70	.80	.80
C	,00	.20	.60	.40	.90	.90	.75	1.00	.90	.85	.75	.65	.50	.70	.35	.30	.25	.40	.35	.35	.35	.60	.35	.35	.35	.40	.50	.70	.80	.70
B							.80																							
C							.75																							
2b.																														
B		.00	.10	.00	.45	.90	.45	1.00	1.00	.75	1.10	.75	1.00	.70	.35	.55	.35	.75	.35	.35	.60	.40	.40	.45	.60	.35	.75	.85	.85	.90
C		.00	.45	.25	.55	.75	.85	.85	.90	.95	1.05	.80	.80	.60	.50	.45	.50	.30	.55	.50	.45	.45	.50	.45	.45	.50	.75	.90	1.05	.95
B							1.10																							
C							.85																							

3a.

	A.M.							P.M.												A.M.										
A	5:23	5:46	7:07	8:07	9:07	10:07	11:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07	11:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07
B	.00	.10	.60	.95	.80	1.20	.95	.85	.80	.45	.50	.35	.45	.20	.30	.40	.30	.20	.35	.30	.15	.30	.30	.30	.30	.45	1.05	1.45	.95	1.10
C	.00	.20	1.05	.90	1.05	1.05	.95	.75	.70	.60	.60	.45	.35	.25	.30	.30	.30	.25	.25	.30	.30	.30	.25	.25	.40	.50	.20	.50	.80	1.10
B							1.00																							
C							.90																							
3b.																														
B		.00	.40	.25	.60	.75	.60	.65	.65	.60	.60	.60	.60	.65	.85	.65	.75	.65	.75	.70	.80	.80	.75	.65	.85	.90	.95	1.25	1.05	1.45
C		.00	.45	.35	.45	.80	.60	.65	.60	.60	.60	.60	.65	.75	.70	.75	.55	.80	.70	.75	.75	.70	.70	.75	.85	.80	.95	1.65	1.00	1.40
B							1.30																							
C							1.35																							

4a.

	A.M.						P.M.												A.M.											
A	6:02	7:02	8:02	9:02	10:02	11:02	12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02	11:02	12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02	11:02
B	.00	.35	.15	.95	.65	1.35	.95	.65	.95	.55	.60	.30	.40	.35	.30	.25	.40	.30	.60	.30	.25	.25	.45	.25	.50	.50	1.10	1.30	1.20	1.30
C	.00	.45	.40	.85	1.00	1.05	1.00	.75	.75	.55	.50	.45	.35	.35	.30	.35	.30	.35	.35	.30	.30	.30	.35	.35	.45	.45	1.25	1.20	1.25	1.15
4b.																														
B		.00	.35	.30	.50	.60	.55	.55	.40	.40	.40	.25	.35	.40	.30	.30	.30	.20	.35	.35	.35	.35	.25	.40	.35	.80	1.55	1.35	1.60	
C		.00	.35	.40	.35	.65	.60	.40	.40	.40	.35	.40	.30	.40	.30	.35	.25	.30	.25	.40	.30	.25	.30	.40	.40	.75	.95	1.45	1.55	

Incre Humidity Under Constant Light During the Day Period.

	A.M.		A.M.								
A	7:04	1:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50
B		.40	.20	.40	.40	.20	.40	.40	.30	.40	.30
C	.00	.35	.30	.35	.35	.30	.35	.50	.30	.30	.40
B		.30	.45	.55	.60	.70	.80	.85	.65	.80	.80
C		.40	.55	.55	.60	.65	.85	.85	.55	.80	.85

	A.M.	A.M.											
A	6:45	2:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27
B B	.00	.25	.15	.30	.20	.20	.25	.15	.30	.25	.25	.40	.30
C C	.00	.15	.15	.30	.20	.25	.25	.20	.70	.20	.40	.35	.35
B B		.60	.50	.60	.65	.80	.60	.80	.95	.95	.95	1.05	.80
C C		.55	.55	.60	.65	.75	.75	.75	.95	.75	1.05	.95	.85

	A.M.										P.M.	
A	8:42	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22	12:22	1:22
B B	.00	.20	.30	.25	.10	.30	.20	.25	.15	.40	.30	.35	.25
C	.00	.25	.15	.30	.20	.20	.30	.20	.30	.30	.35	.40	.30
B		.35	.50	.60	.45	.80	.85	.75	.80	.85	.85	.75	.70
C		.40	.40	.55	.60	.60	.90	.75	.85	.80	.75	.80	.65

	A.M.	A.M.											
A	6:40	2:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05
B B	.00	.10	.20	.15	.25	.15	.20	.15	.10	.25	.25	.25	.35
C	.00	.20	.10	.20	.20	.20	.20	.25	.15	.30	.15	.60	.35
B B		.15	.20	.15	.25	.20	.25	.40	.15	.50	.40	.50	.60
C		.20	.15	.25	.20	.25	.20	.30	.30	.40	.50	.55	.60

TABLE XVIII.

Increments of Absorption and Transpiration for Phaseolus Grown at 25°C. and 45 Percent. Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration

	A.M.							P.M.								1a.				A.M.								
A	7:04	7:35	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50
B			.00	.50	-.50	.20	.65	.65	.40	.20	.20	.40	.35	.25	.40	.20	.50	.20	.40	.20	.40	.40	.20	.40	.40	.30	.40	.30
C	.00		.00	.60	.35	.40	.40	.45	.50	.45	.35	.30	.45	.35	.20	.35	.40	.25	.35	.30	.35	.35	.30	.35	.50	.30	.30	.40
																1b.												
B		.00	.25	.30	.40	.40	.35	.25	.45	.30	.45	.30	.60	.30	.25	.30	.45	.40	.30	.45	.55	.60	.70	.80	.85	.65	.80	.80
C		.00	.05	.50	.50	.35	.35	.25	.40	.35	.70	.35	.35	.70	.30	.30	.40	.30	.40	.55	.55	.60	.65	.85	.85	.55	.80	.85

	A.M.						P.M.									2a.			A.M.											
A	6:45	7:25	8:27	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27
B	.00	.10	.05	.05	.05	.05	.35	.40	.45	.30	.40	.30	.40	.35	.25	.15	.25	.20	.25	.15	.30	.20	.20	.25	.15	.30	.25	.25	.40	.30
B							.35	.25	.40	.30	.30																			
C	.00		.30	.35	.40	.40	.50	.50	.45	.35	.45	.30	.25	.20	.25	.25	.20	.20	.15	.15	.30	.20	.25	.25	.20	.70	.20	.40	.35	.35
C							.30	.35	.35	.35	.25																			
																2b.														
B		.00	.15	.20	.55	.55	.95	.85	.95	.55	.80	.60	.50	.55	.25	.40	.45	.55	.60	.50	.60	.65	.80	.60	.80	.95	.95	.95	1.05	.80
B							.95	.85	.80	.80	.70																			
C		.00	.65	.40	.50	.70	.90	.85	.85	.90	.70	.50	.70	.45	.45	.45	.40	.45	.55	.55	.60	.65	.75	.75	.75	.95	.75	1.05	.95	.85
C							.85	.80	.80	.75	.80																			

	A.M.				P.M.											3a.	A.M.												P.M.	
A	8:42	9:22	10:24	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22	12:22	1:22
B	.00	.20	.40	.50	.40	.40	.30	.40	.15	.35	.10	.40	.20	.15	.15	.30	.20	.15	.20	.30	.25	.10	.30	.20	.25	.15	.40	.30	.35	.25
B							.40	.35	.35																					
C	.00	.40	.45	.35	.55	.35	.35	.30	.20	.25	.20	.20	.20	.20	.20	.35	.15	.25	.25	.15	.30	.20	.20	.30	.20	.30	.30	.35	.40	.30
							.35	.35	.30																					
																3b.														
B		.00	.15	.45	.60	.65	.65	.45	.50	.35	.50	.40	.30	.40	.30	.30	.40	.35	.35	.50	.60	.45	.80	.85	.75	.80	.85	.85	.75	.70
							.70	.65	.70																					
C		.00	.80	.55	.60	.65	.60	.40	.50	.55	.25	.40	.30	.40	.30	.40	.40	.35	.40	.40	.55	.60	.60	.90	.75	.85	.80	.75	.80	.65
							.70	.70	.60																					

	A.M.						P.M.									4a.			A.M.											
A	6:40	7:05	8:05	9:05	10:05	11:05	12:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05	12:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05
B	.00	.05	.35	.40	.45	.35	.55	.35	.45	.30	.40	.30	.20	.40	.15	.20	.10	.25	.10	.20	.15	.25	.15	.20	.15	.10	.25	.25	.25	.35
B							.25	.30	.20	.50	.45	.50																		
C	.00	.25	.45	.60	.40	.55	.45	.55	.50	.30	.35	.15	.35	.10	.15	.15	.20	.20	.20	.10	.20	.20	.20	.20	.25	.15	.30	.15	.60	.35
							.25	.25	.55	.50	.40	.40																		
																4b.														
B		.00	.10	.60	.25	.45	.50	.50	.45	.35	.30	.30	.30	.30	.20	.20	.15	.30	.15	.20	.15	.25	.20	.25	.40	.15	.50	.40	.50	.60
B							.65	.65	.70	.75	.75	.60																		
C		.00	.35	.45	.55	.45	.50	.50	.55	.35	.30	.20	.30	.15	.20	.20	.25	.25	.20	.15	.25	.20	.25	.20	.30	.30	.40	.50	.55	.60
							.55	.65	.90	.75	.75	.70																		

ed)

	A.M.										P.M.		
A	9:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27	12:27	1:27	2:27
B B	.00	.25	.20	.25	.05	.05	.05	.35	.15	.25	.25	.25	.35
C C	.00	.15	.15	.10	.15	.15	.25	.30	.15	.30	.20	.55	.20
B B		.30	.50	.35	.35	.20	.45	.45	.55	.50	.40	.70	.70
C		.35	.30	.15	.55	.35	.40	.60	.40	.55	.65	.70	.60

TABLE XVIII (Continued)

5a.

	A.M.			P.M.												A.M.												P.M.		
A	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27	12:27	1:27	2:27
B	.00	.45	.75	.55	.35	.40	.50	.25	.35	.10	.20	.05	.25	.30	.10	.10	.15	.10	.25	.20	.25	.05	.05	.05	.35	.15	.25	.25	.25	.35
B							.25	.25	.20																					
C	.00	.45	.50	.70	.65	.30	.45	.20	.30	.20	.20	.15	.15	.25	.10	.20	.10	.15	.15	.15	.10	.15	.15	.25	.30	.15	.30	.20	.55	.20
C							.45	.45	.10																					

5b.

B			.00	1.00	1.75	.85	.75	.60	1.05	.20	.20	.30	.25	.35	.40	.35	.25	.35	.30	.50	.35	.35	.20	.45	.45	.55	.50	.40	.70	.70
B							.75	.80	.70																					
C			.15	1.00	.80	.80	.85	.45	.65	.30	.55	.30	.40	.30	.30	.35	.40	.35	.35	.30	.15	.55	.35	.40	.60	.40	.55	.65	.70	.60
C							.85	.95	.35																					

Incre Humidity Under Constant Light During the Day Period.

A	A.M. 5:06	33	11:33	A.M. 12:33	1:33	2:33	3:33	4:33	5:33	6:33	7:33	8:33	9:33
B	.00	25	.10	.15	.10	.10	.30	.10	.10	.20	.35	.30	.35
C	.00	15	.10	.20	.15	.15	.20	.10	.15	.15	.35	.30	.40
B		35	.25	.55	.30	.60	.40	.40	.60	.45	.60	.45	.55
C		60	.60	.40	.45	.55	.60	.35	.55	.45	.65	.55	.55

A	A.M. 6:05	:27	A.M. 12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27
B	.00	.05	.15	.10	.25	.20	.10	.10	.20	.25	.25	.30
C	.00	.10	.15	.15	.15	.20	.10	.20	.15	.25	.30	.25
B		.40	.55	.55	.65	.65	.40	.70	.40	.65	.60	.65
C		.35	.55	.50	.55	.60	.40	.55	.40	.65	.60	.40

A	A.M. 5:02	24	11:24	A.M. 12:24	1:24	2:24	3:24	4:24	5:24	6:24	7:24	8:24	9:24
B	.00	30	.30	.35	.35	.30	.30	.20	.20	.25	.25	.25	.45
C	.00	20	.25	.15	.20	.25	.20	.25	.25	.20	.30	.40	.40
B		30	.40	.45	.35	.50	.50	.50	.60	.50	.35	.75	.45
C		35	.60	.45	.45	.45	.50	.45	.60	.35	.55	.60	.60

A	A.M. 6:20	:22	A.M. 12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22
B	.00	.25	.25	.20	.20	.25	.20	.45	.25	.20	.40	.25
C		.20	.25	.30	.20	.30	.20	.35	.15	.35	.20	.45
B		.60	.35	.25	.60	.30	.60	.60	.35	.55	.55	.60
C		.40	.40	.45	.40	.45	.45	.60	.30	.50	.55	.50

TABLE XIX.

Increments of Absorption and Transpiration for Phaseolus Grown at 20°C. and 45 Percent. Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration

	A.M.								P.M.												A.M.									
A	5:06	5:33	6:33	7:33	8:33	9:33	10:33	11:33	12:33	1:33	2:33	3:33	4:33	5:33	6:33	7:33	8:33	9:33	10:33	11:33	12:33	1:33	2:33	3:33	4:33	5:33	6:33	7:33	8:33	9:33
															1a.															
B	.00		.30	.50	.50	.65	.50	.45	.30	.55	.45	.45	.25	.25	.20	.20	.25	.20	.25	.10	.15	.10	.10	.30	.10	.10	.20	.35	.30	.35
C	.00		.45	.40	.45	.40	.60	.55	.55	.60	.45	.35	.35	.30	.20	.10	.15	.15	.15	.10	.20	.15	.15	.20	.10	.15	.15	.35	.30	.40
															1b.															
B		.00		.40	.40	.35	.45	.30	.30	.60	.60	.30	.60	.60	.60	.30	.30	.55	.35	.25	.55	.30	.60	.40	.40	.60	.45	.60	.45	.55
C		.00	.70	.35	.45	.15	.45	.35	.50	.60	.45	.50	.50	.50	.50	.40	.40	.60	.60	.60	.40	.45	.55	.60	.35	.55	.45	.65	.55	.55

	A.M.							P.M.												A.M.									
A	6:05	6:27	7:27	8:27	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27
															2a.														
B	.00	.20	.40	.50	.30	.75	.45	.50	.50	.30	.40	.30	.25	.25	.20	.20	.25	.20	.05	.15	.10	.25	.20	.10	.10	.20	.25	.25	.30
C	.00	.20	.45	.45	.45	.55	.45	.50	.50	.40	.35	.30	.20	.25	.15	.20	.15	.15	.10	.15	.15	.15	.20	.10	.20	.15	.25	.30	.25
															2b.														
B		.00	.05	.35	.40	.35	.45	.40	.40	.40	.40	.60	.60	.40	.40	.75	.40	.35	.40	.55	.55	.65	.65	.40	.70	.40	.65	.60	.65
C		.00	.50	.35	.25	.35	.35	.55	.50	.50	.55	.55	.45	.50	.60	.40	.50	.55	.35	.55	.50	.55	.60	.40	.55	.40	.65	.60	.40

	A.M.								P.M.												A.M.									
A	5:02	5:23	6:24	7:24	8:24	9:24	10:24	11:24	12:24	1:24	2:24	3:24	4:24	5:24	6:24	7:24	8:24	9:24	10:24	11:24	12:24	1:24	2:24	3:24	4:24	5:24	6:24	7:24	8:24	9:24
															3a.															
B	.00	.00	.15	.05	.15	.35	.35	.30	.30	.40	.20	.30	.25	.30	.30	.20	.25	.15	.30	.30	.35	.35	.30	.30	.20	.20	.25	.25	.25	.45
C	.00	.20	.35	.40	.25	.05	.30	.30	.40	.35	.50	.30	.35	.25	.25	.25	.20	.25	.20	.25	.15	.20	.25	.20	.25	.25	.20	.30	.40	.40
															3b.															
B		.00	.00	.45	.30	.40	.40	.35	.35	.75	.35	.40	.30	.40	.50	.35	.40	.45	.30	.40	.45	.35	.50	.50	.50	.60	.50	.35	.75	.45
C		.00	.35	.30	.35	.30	.40	.50	.50	.60	.45	.40	.40	.50	.40	.20	.40	.40	.35	.60	.45	.45	.45	.50	.45	.60	.35	.55	.60	.60

	A.M.							P.M.												A.M.									
A	6:20	6:50	7:20	8:20	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22
															4a.														
B	.00	.10	.05	.10	.20	.40	.25	.25	.20	.30	.40	.30	.25	.25	.35	.30	.25	.20	.25	.25	.20	.20	.25	.20	.45	.25	.20	.40	.25
C		.15	.25	.40	.25	.25	.20	.40	.25	.25	.25	.30	.20	.45	.15	.25	.20	.30	.20	.25	.30	.20	.30	.20	.35	.15	.35	.20	.45
															4b.														
B		.00		.35	.35	.05	.40	.40	.40	.05	.35	.35	.35	.50	.45	.30	.30	.30	.60	.35	.25	.60	.30	.60	.60	.35	.55	.55	.60
C			.20	.40	.30	.40	.30	.30	.25	.40	.30	.45	.30	.40	.35	.35	.35	.45	.40	.40	.45	.40	.45	.45	.60	.30	.50	.55	.50

Incre Humidity Under Constant Light During the Day Period.

A	A.M. 7:05	A.M. 12:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05
B	.00	.10	.20	.20	.20	.15	.15	.20	.20	.15	.35	.30	.50
B													
C	.00	.15	.20	.15	.20	.10	.20	.25	.20	.20	.30	.45	.40
C													
B		.20	.25	.25	.20	.34	.30	.45	.20	.40	.40	.45	.85
B													
C		.25	.20	.25	.30	.30	.25	.55	.30	.30	.50	.65	.60

A	A.M. 10:03	3:28	4:28	5:28	6:28	7:28	8:28	9:28	10:28	11:28	P.M. 12:28	1:28
B	.06	.05	.10	.30	.15	.10	.40	.20	.35	.45	.30	.55
B												
C	.06	.15	.10	.25	.10	.25	.30	.20	.35	.40	.35	.35
C												
B	5	.35	.30	.40	.30	.30	.45	.20	.40	.35	.60	.35
B												
C	0	.20	.30	.40	.25	.30	.40	.25	.45	.50	.40	.40
C												

A	AM. 7:25	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
B	.00	.10	.20	.15	.10	.05	.20	.10	.20
C	.00	.15	.10	.10	.15	.15	.15	.15	.20
B	.00	.30	.30	.15	.35	.25	.35	.25	.45
C	.00	.25	.25	.35	.30	.25	.30	.30	.40

A	A.M. 6:50	A.M. 12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10	11:10
B	.00	.10	.10	.15	.15	.15	.05	.10	.25	.30	.25	.45	.20
B													
C	.00	.10	.10	.10	.15	.10	.15	.10	.15	.30	.30	.30	.30
C													
B		.45	.25	.25	.45	.30	.20	.50	.30	.40	.55	.45	.60
B													
C		.25	.35	.30	.30	.30	.30	.30	.35	.60	.50	.50	.30

T A B L E   X X

Increments of Absorption and Transpiration for Phaseolus Grown at 15°C. and 45 Percent. Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration

	A.M. 7:05	7:35	8:05	9:05	10:05	11:05	P.M. 12:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05	A.M. 12:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05
1a. B	.00		.70	.35	.35	.35	.30	.25	.25	.30	.20	.20	.30	.30	.20	.05	.10	.20	.10	.20	.20	.20	.15	.15	.20	.20	.15	.35	.30	.50
B							.35	.55	.40	.40	.35	.45																		
C	.00		.70	.25	.50	.30	.25	.25	.20	.30	.20	.20	.30	.20	.30	.25	.15	.20	.15	.20	.15	.20	.10	.20	.25	.20	.20	.30	.45	.40
C							.45	.55	.40	.55	.20	.55																		
1b. B		.00	.00	.55	.80	.85	.45	.45	.25	.20	.40	.20	.25	.30	.40	.25	.25	.20	.20	.25	.25	.20	.34	.30	.45	.20	.40	.40	.45	.85
B							.45	.90	.60	.60	.40	.65																		
C		.00	.60	.50	.70	.55	.40	.45	.30	.30	.25	.35	.25	.20	.40	.30	.35	.20	.25	.20	.25	.30	.30	.25	.55	.30	.30	.50	.65	.60
C							.75	.30	.50	.35	.35	.30																		

	A.M. 10:03	10:28	11:28	P.M. 12:28	1:28	2:28	3:28	4:28	5:28	6:28	7:28	8:28	9:28	10:28	11:28	A.M. 12:28	1:28	2:28	3:28	4:28	5:28	6:28	7:28	8:28	9:28	10:28	11:28	P.M. 12:28	1:28
2a. B	.00	.30	.25	.35	.30	.25	.25	.20	.30	.35	.30	.25	.10	.25	.15	.05	.40	.35	.05	.10	.30	.15	.10	.40	.20	.35	.45	.30	.55
B						.20	.20																						
C	.00	.50	.25	.30	.25	.25	.35	.20	.20	.30	.25	.25	.25	.10	.15	.20	.20	.15	.15	.10	.25	.10	.25	.30	.20	.35	.40	.35	.35
C						.25	.30																						
2b. B			.00	.30	.40	.75	.40	.60	.30	.35	.35	.20	.15	.30	.20	.30	.30	.25	.35	.30	.40	.30	.30	.45	.20	.40	.35	.60	.35
B						.40	.40																						
C				.45	.50	.55	.65	.30	.25	.40	.25	.30	.25	.20	.30	.30	.25	.30	.20	.30	.40	.25	.30	.40	.25	.45	.50	.40	.40
C						.45	.30																						

	AM. 7:25	8:00	9:00	10:00	11:00	P.M. 12:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	A.M. 12:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
3a. B	.00	.20	.40	.45	.45	.30	.35	.65	.70	.30	.25	.15	.25	.35	.10	.20	.15	.05	.10	.20	.15	.10	.05	.20	.10	.20
C	.00	.30	.40	.50	.35	.35	.25	.30	.25	.20	.30	.05	.20	.35	.10	.15	.15	.10	.15	.10	.10	.15	.15	.15	.15	.20
3b. B	.00	.10	.75	.70	.80	.55	.70	.55	.55	.35	.40	.25	.40	.25	.20	.45	.25	.25	.30	.30	.15	.35	.25	.35	.25	.45
C	.00	.45	.60	.55	.75	.75	.55	.40	.55	.30	.35	.30	.30	.35	.30	.25	.30	.25	.25	.25	.35	.30	.25	.30	.30	.40

	A.M. 6:50	7:10	8:10	9:10	10:10	11:10	P.M. 12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10	11:10	A.M. 12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10	11:10
4a. B	.00		.25	.55	.25	.45	.35	.30	.35	.35	.40	.35	.35	.40	.10	.25	.20	.05	.10	.10	.15	.15	.15	.05	.10	.25	.30	.25	.45	.20
B							.35	.40	.30	.30	.40																			
C	.00	.20	.45	.60	.50	.40	.35	.20	.40	.35	.45	.40	.40	.40	.05	.30	.15	.05	.10	.10	.10	.15	.10	.15	.10	.15	.30	.30	.30	.30
C							.40	.35	.40	.40	.25																			
4b. B		.00	.00	.30	.60	.60	.30	.35	.25	.30	.50	.20	.50	.20	.45	.05	.25	.25	.45	.25	.25	.45	.30	.20	.50	.30	.40	.55	.45	.60
B							.30	.40	.40	.40	.25																			
C		.00	.35	.55	.50	.50	.35	.25	.25	.35	.25	.35	.35	.60	.30	.30	.15	.35	.25	.35	.30	.30	.30	.30	.30	.35	.60	.50	.50	.30
C							.50	.35	.45	.40	.30																			

A	A.M. 9:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05	P.M. 12:05	1:05	2:05
B B	.00	.05	.10	.15	.20	.05	.30	.05	.35	.25	.25	.05	.20
C C	.00	.10	.10	.15	.15	.10	.15	.20	.30	.35	.30	.40	.20
B B	.10	.25	.25	.20	.25	.25	.20	.45	.30	.40	.30	.50	.35
C C	.25	.15	.20	.25	.20	.20	.30	.35	.35	.55	.35	.40	.25

5a.

	A.M.			P.M.												A.M.												P.M.		
A	9:05	10:05	11:05	12:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05	12:05	1:05	2:05	3:05	4:05	5:05	6:05	7:05	8:05	9:05	10:05	11:05	12:05	1:05	2:05
B	.00	.20	.30	.25	.30	.25	.15	.15	.30	.10	.30	.30	.15	.20	.05	.15	.05	.25	.05	.10	.15	.20	.05	.30	.05	.35	.25	.25	.05	.20
F							.20	.40																						
C	.00	.05	.30	.20	.20	.20	.15	.15	.25	.20	.25	.20	.20	.10	.10	.10	.20	.10	.10	.10	.15	.15	.10	.15	.20	.30	.35	.30	.40	.20
C							.40	.25																						

5b.

B	.10	.35	.55	.60	.50	.50	.20	.30	.30	.25	.35	.20	.25	.20	.15	.25	.25	.30	.25	.25	.20	.25	.25	.20	.45	. 30	.40	.30	.50	.35
B							.40	.35																						
C	.25	.35	.55	.55	.40	.40	.25	.25	.30	.30	.40	.20	.25	.25	.15	.25	.25	.30	.15	.20	.25	.20	.20	.30	.35	.35	.55	.35	.40	.25
C							.35	.35																						

Iive Humidity Under Constant Light During the Day Period

	A.M		A.M.										
A	5:3	11:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07
B	.0	.65	.60	.70	.75	.85	.70	1.10	.80	.90	1.00	.95	.75
C	.0	.65	.65	.80	.70	.75	.95	.95	.95	1.00	.80	.85	.75
B		.75	.65	.65	.80	.85	.85	.70	1.00	.90	1.00	.80	1.05
C		.60	.60	.80	.70	.75	.85	.85	.85	.95	.90	.90	.95

	A.	P.M.										
A	7:1	12:01	1:01	2:01	3:01	4:01	5:01	6:01	7:01	8:01	9:01	10:01
B	.0	.95	1.05	1.10	1.00	1.10	1.10	1.10	1.00	1.10	1.05	1.05
C	.0	1.00	.85	.90	1.00	1.15	1.05	1.10	1.05	1.05	1.10	1.05
B		1.20	1.20	1.00	1.20	1.30	1.10	1.30	1.20	1.05	1.10	1.05
C		1.05	1.40	1.05	1.25	1.10	1.20	1.20	1.10	1.30	1.10	1.05

	A.M			A.M.									
A	5:2	10:58	11:58	12:58	1:58	2:58	3:58	4:58	5:58	6:58	7:58	8:58	9:58
B	.0	.30	.35	.40	.35	.40	.70	.55	1.15	.60	.60	.70	.70
C	.0	.30	.35	.30	.35	.50	.35	1.05	1.15	.60	.65	.80	.75
B		.85	.85	.70	1.00	.80	1.40	.95	1.50	1.05	1.30	1.30	1.35
C		.75	.85	.85	.85	.95	.75	.90	1.50	.60	1.55	1.35	1.30

	A.M	A.M.										
A	6:4	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07
B	.0	.50	.40	.50	.50	.60	1.00	.80	.75	.95	1.10	1.00
C	.0	.55	.40	.50	.60	.45	1.15	.70	.75	1.05	1.05	1.10
B		1.20	1.45	1.35	1.65	1.35	2.20	1.55	1.75	1.70	2.25	
C		1.30	1.30	1.45	1.60	1.30	1.75	1.70	1.70	1.75	2.20	

TABLE XXI.

Increments of Absorption and Transpiration for Phaseolus Grown at 35°C. and 75 Percent. Relative Humidity Under Constant Light During the Day Period

A - Time
B - Increment of Absorption
C - Increment of Transpiration.

	A.M.							P.M.							1a.					A.M.										
A	5:30	6:04	7:07	8:07	9:07	10:07	11:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07	11:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07
B	.00	.05	1.40	1.00	.95	.85	1.00	1.00	1.30	.80	1.25	.75	.95	1.00	.85	1.00	1.70	. 55	.65	.60	.70	.75	.85	.70	1.10	.80	.90	1.00	.95	.75
C	.00	.60	1.20	1.50	1.00	. 85	1.00	.95	1.05	1.05	1.10	.80	.95	.95	1.10	.80	.65	. 65	.65	.65	.80	.70	.75	.95	.95	.95	1.00	.80	.85	.75
															1b.															
B		.00	.50	1.30	1.40	.75	1.35	.95	.85	1.15	1.55	1.10	.80	1.15	1.35	1.00	1.15	.75	.75	.65	.65	.80	.85	.85	.70	1.00	.90	1.00	.80	1.05
C		.00	1.15	1.25	1.30	1.00	1.15	.95	1.35	1.00	1.15	.90	.95	1.00	1.20	1.00	.95	.80	.60	.60	.80	.70	.75	.85	.85	.85	.95	.90	.90	.95

	A.M.						P.M.								2a.				P.M.										
A	7:18	7:45	8:01	9:00	10:01	11:01	12:01	1:01	2:01	3:01	4:01	5:01	6:01	7:01	8:01	9:01	10:01	11:01	12:01	1:01	2:01	3:01	4:01	5:01	6:01	7:01	8:01	9:01	10:01
B	.00	.30	.35	1.10	1.30	1.05	1.15	1.00	.85	1.10	1.05	1.05	.85	1.00	1.10	.85	1.20	.95	.95	1.05	1.10	1.00	1.10	1.10	1.10	1.00	1.10	1.05	1.05
C	.00	.40	.30	1.40	1.40	1.45	1.30	1.05	.85	.95	.90	.95	.85	.95	1.15	1.00	1.30	1.00	1.00	.85	.90	1.00	1.15	1.05	1.10	1.05	1.05	1.10	1.05
															2b.														
B		.00	.10	1.30	1.45	1.60	1.80	1.55	1.80	1.70	1.65	1.45	1.40	1.40	1.50	1.25	1.25	.90	1.20	1.20	1.00	1.20	1.30	1.10	1.30	1.20	1.05	1.10	1.05
C		.00	.20	1.50	1.95	1.85	1.95	1.60	1.55	1.65	1.65	1.45	1.45	1.40	1.25	1.15	1 .20	.95	1.05	1.40	1.05	1.25	1.10	1.20	1.20	1.10	1.30	1.10	1.05

	A.M.								P.M.						3a.						A.M.									
A	5:22	5:58	6:58	7:58	8:58	9:58	10:58	11:58	12:58	1:58	2:58	3:58	4:58	5:58	6:58	7:58	8:58	9:58	10:58	11:58	12:58	1:58	2:58	3:58	4:58	5:58	6:58	7:58	8:58	9:58
B	.00	.90	1.15	1.75	1.00	1.35	1.45	1.85	1.35	1.10	.85	.85	.80	.90	.60	.40	.40	.30	.30	.35	.40	.35	.40	.70	.55	1.15	.60	.60	.70	.70
C	.00	1.20	1.35	1.85	1.20	1.45	1.75	1.40	1.00	.90	1.00	.80	.75	.90	.45	.30	.30	.35	.30	.35	.30	.35	.50	.35	1.05	1.15	.60	.65	.80	.75
															3b.															
B		.00	.30	.60	.60	.55	1.00	.70	1.00	.80	.85	.95	.80	1.40	.80	.90	.80	.70	.85	.85	.70	1.00	.80	1.40	.95	1.50	1.05	1.30	1.30	1.35
C		.00	.25	1.05	.65	.60	.75	1.65	.80	1.40	.70	.80	.80	1.05	.80	.75	.80	.75	.75	.85	.85	.85	.95	.75	.90	1.50	.60	1.55	1.35	1.30

	A.M.						P.M.								4a.				A.M.										
A	6:43	7:07	8:07	9:07	10:07	11:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07	11:07	12:07	1:07	2:07	3:07	4:07	5:07	6:07	7:07	8:07	9:07	10:07
B	.00	.05	.40	.85	.90	1.35	1.10	1.10	.90	.70	1.10	.65	1.05	.70	.40	.60	.70	.50	.50	.40	.50	.50	.60	1.00	.80	.75	.95	1.10	1.00
C	.00	.20	.60	.80	1.20	1.35	1.20	.90	.95	.80	.95	.60	.70	.65	.45	.55	.75	.45	.55	.40	.50	.60	.45	1.15	.70	.75	1.05	1.05	1.10
															4b.														
B		.00	.40	.40	1.20	1.40	1.60	1.70	1.40	1.40	1.60	1.40	2.00	1.30	1.35	1.45	1.75	1.35	1.20	1.45	1.35	1.65	1.35	2.20	1.55	1.75	1.70	2.25	
C		.00	.20	.80	1.25	1.65	1.55	1.45	1.30	1.40	1.40	1.45	1.65	1.60	1.30	1.40	1.35	1.30	1.30	1.30	1.45	1.60	1.30	1.75	1.70	1.70	1.75	2.20	

Incre Humidity Under Constant Light During the Day Period.

A	A.M. 5:50	50	11:50	A.M. 12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50
B	.00	25	.25	.20	.20	.40	.20	.60	.45	.30	.60	.40	.40
C	.00	30	.30	.20	.30	.35	.15	.50	.45	.50	.60	.55	.40
B		10	.30	.30	.30	.10	.50	.70	.70	1.10	.80	.80	.80
C		20	.25	.25	.30	.55	.45	.85	.85	1.00	.90	.60	.70

A	A.M. 7:22	.M. 2:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
B	.00	.20	.20	.10	.15	.25	.20	.20	.30	.20	.15
C	.00	.10	.20	.25	.15	.15	.20	.20	.25	.35	.20
B		.25	.15	.15	.40	.20	.25	.40	.20	.35	.30
		.25	.20	.25	.20	.30	.20	.25	.35	.30	.30

A	A.M. 6:08	:27	A.M. 12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27
B		.15	.15	.05	.20	.10	.20	.05	.05	.20	.15	.25
C		.10	.20	.10	.10	.10	.10	.10	.15	.25	.10	.25
B		20	.15	.20	.20	.25	.25	.30	.25	.15	.35	.35
C		20	.25	.20	.20	.25	.20	.25	.20	.30	.30	.40

A	7:01	:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22
B	.00	.25	.10	.10	.05	.20	.10	.25	.25	.05	.30	.40
C	.00	.15	.15	.15	.15	.30	.20	.25	.20	.25	.35	.35
B		.25	.15	.15	.15	.25	.15	.20	.20	.20	.30	.20
C		.15	.20	.20	.15	.25	.20	.20	.20	.20	.25	.30

TABLE XXII.

Increments of Absorption and Transpiration for Phaseolus Grown at 30°C. and 75 Percent. Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration

A	A.M. 5:50	6:30	6:50	7:50	8:50	9:50	10:50	11:50	P.M. 12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	A.M. 12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50
1a.																														
B	.00	.20	.20	.20	.55	.45	.70	.50	.25	.45	.40	.20	.40	.30	.20	.20	.25	.20	.25	.25	.20	.20	.40	.20	.60	.45	.30	.60	.40	.40
C	.00	.40	.05	.45	.75	.50	.90	.45	.40	.45	.35	.30	.20	.30	.30	.25	.30	.25	.30	.30	.20	.30	.35	.15	.50	.45	.50	.60	.55	.40
1b.																														
B		.00		.10	.40	.30	.30	.30	.25	.35	.30	.25	.05	.40	.15	.05	.35	.25	.10	.30	.30	.30	.10	.50	.70	.70	1.10	.80	.80	.80
C		.00		.40	.20	.35	.30	.25	.30	.25	.20	.25	.25	.20	.20	.25	.25	.25	.20	.25	.25	.30	.55	.45	.85	.85	1.00	.90	.60	.70

A	A.M. 7:22	7:55	8:55	9:55	10:55	11:55	P.M. 12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55	10:55	11:55	A.M. 12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
2a.																												
B	.00	.20	.05	.40	.50	.50	.20	.20	.50	.20	.20	.30	.20	.10	.30	.15	.05	.20	.20	.20	.10	.15	.25	.20	.20	.30	.20	.15
C	.00	.15	.35	.50	.40	.35	.35	.30	.30	.20	.20	.25	.20	.20	.15	.20	.10	.20	.10	.20	.25	.15	.15	.20	.20	.25	.35	.20
2b.																												
B		.00	.00	.45	.35	.40	.40	.35	.35	.05	.40	.20	.15	.25	.30	.20	.10	.25	.25	.15	.15	.40	.20	.25	.40	.20	.35	.30
			.45	.45	.40	.35	.35	.25	.30	.25	.25	.25	.20	.20	.15	.15	.25	.15	.25	.20	.25	.20	.30	.20	.25	.35	.30	.30

A	A.M. 6:08	6:27	7:27	8:27	9:27	10:27	11:27	P.M. 12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27	10:27	11:27	A.M. 12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27	8:27	9:27
3a.																													
B		.05	.10	.30	.25	.55	.25	.60	.10	.00	.20	.25	.20	.15	.20	.15	.15	.05	.15	.15	.05	.20	.10	.20	.05	.05	.20	.15	.25
C		.15	.20	.55	.25	.35	.35	.65	.30	.25	.25	.15	.20	.15	.15	.15	.10	.10	.10	.20	.10	.10	.10	.10	.10	.15	.25	.10	.25
3b.																													
B		.00	.30	.50	.65	.50	.45	.50	.55	.40	.45	.40	.25	.15	.25	.25	.35	.20	.20	.15	.20	.20	.25	.25	.30	.25	.15	.35	.35
C		.00	.00	.55	.55	.50	.50	.45	.50	.40	.35	.30	.25	.20	.25	.25	.15	.20	.20	.25	.20	.20	.25	.20	.25	.20	.30	.30	.40

A	7:01	7:18	7:22	8:22	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22
4a.																													
B	.00	.05	.05	.60	.30	.60	.30	.25	.55	.25	.25	.30	.20	.20	.10	.20	.25	.05	.25	.10	.10	.05	.20	.10	.25	.25	.05	.30	.40
C	.00		.20	.35	.45	.30	.45	.35	.40	.25	.25	.20	.25	.15	.15	.15	.20	.10	.15	.15	.15	.15	.30	.20	.25	.20	.25	.35	.35
4b.																													
B		.00	.05	.35	.30	.70	.30	.30	.35	.35	.30	.25	.25	.00	.20	.20	.30	.50	.25	.15	.15	.15	.25	.15	.20	.20	.20	.30	.20
C		.00		.30	.35	.35	.40	.40	.30	.25	.20	.20	.20	.15	.15	.15	.20	.10	.15	.20	.20	.15	.25	.20	.20	.20	.20	.25	.30

Incre Humidity Under Constant Light During the Day Period.

A	A.M. 6:52	.M. 2:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22
B		.20	.15	.10	.25	.10	.15	.20	.30	.10	.40	.15	.45
B C		.15	.20	.15	.15	.15	.20	.20	.20	.25	.35	.20	.25
C													
B		.20	.30	.15	.45	.30	.35	.45	.60	.45	.55	.45	.65
B C		.25	.25	.40	.20	.45	.40	.40	.45	.55	.35	.70	.60
C													
A	A.M. 8:57	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	P.M. 12:30	1:30
B	.00	.20	.10	.20	.15	.20	.10	.25	.20	.30	.20	.50	.50
B C	.00	.15	.15	.15	.15	.20	.10	.25	.35	.45	.40	.45	.35
C													
B		.30	.10	.30	.30	.40	.40	.30	.50	.50	.60	.60	.60
B C		.30	.25	.25	.30	.35	.35	.40	.55	.50	.50	.50	.50
C													
A	A.M. 6:27	:56	A.M. 12:56	1:56	2:56	3:56	4:56	5:56	6:56	7:56	8:56	9:56	10:56
B	.00	.20	.35	.10	.25	.20	.20	.30	.30	.50	.40	.25	.45
B C	.00	.25	.20	.30	.10	.25	.35	.40	.70	.40	.40	.35	.40
C													
B		.10	.30	.10	.15	.20	.20	.20	.30	.50	.50	.40	.40
B C		.20	.15	.15	.10	.20	.05	.60	.35	.45	.40	.45	.35
C													
A	A.M. 8:33	2:01	3:01	4:01	5:01	6:01	7:01	8:01	9:01	10:01	11:01	P.M. 12:01	1:01
B	.00	.30	.10	.10	.40	.20	.20	.20	.30	.20	.45	.15	.30
B C	.00	.25	.15	.20	.30	.10	.20	.20	.35	.30	.25	.25	.25
C													
B		.30	.10	.05	.15	.10	.10	.15	.05	.25	. .05	.25	.15
B C		.10	.15	.10	.10	.00	.05	.10	.20	.15	.05	.20	.05
C													

TABLE XXIII

Increments of Absorption and Transpiration for Phaseolus Grown at 25°C. and 75 Percent Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration

	A.M.						P.M.								1a.				A.M.											
A	6:52	7:20	8:22	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22	5:22	6:22	7:22	8:22	9:22	10:22	11:22
B			.00	.20	.40	.20	.50	.45	.25	.40	.40	.20	.30	.15	.10	.10	.10	.25	.20	.15	.10	.25	.10	.15	.20	.30	.10	.40	.15	.45
B							.25	.25	.40	.30																				
C			.00	.25	.30	.35	.50	.40	.40	.45	.25	.20	.30	.10	.15	.15	.15	.15	.15	.20	.15	.15	.15	.20	.20	.20	.25	.35	.20	.25
C							.40	.35	.30	.25																				
															1b.															
B		.00	.25	.20	.10	.20	.30	.35	.35	.20	.40	.40	.20	.20	.25	.20	.25	.20	.20	.30	.15	.45	.30	.35	.45	.60	.45	.55	.45	.65
B							.50	.55	.45	.55																				
C		.00	.60	.25	.15	.20	.35	.45	.45	.35	.25	.25	.30	.10	.30	.15	.30	.15	.25	.25	.40	.20	.45	.40	.40	.45	.55	.35	.70	.60
C							1.00	.50	.40	.60																				

	A.M.				P.M.										2a.		A.M.												P.M.	
A	8:57	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30
B	.00	.40	.45	.35	.30	.70	.25	.05	.20	.30	.10	.20	.30	.10	.05	.20	.05	.20	.20	.10	.20	.15	.20	.10	.25	.20	.30	.20	.50	.50
B							.20	.45																						
C	.00	.50	.25	.45	.45	.35	.35	.15	.20	.10	.25	.20	.15	.15	.20	.20	.15	.15	.15	.15	.15	.15	.20	.10	.25	.35	.45	.40	.45	.35
C							.40	.30																						
															2b.															
B		.00	.65	.40	.75	.50	.45	.45	.20	.55	.25	.40	.20	.30	.10	.25	.35	.30	.30	.10	.30	.30	.40	.40	.30	.50	.50	.60	.60	.60
B							.35	.65																						
C		.00	.45	.55	.50	.60	.20	.30	.45	.45	.40	.20	.35	.25	.25	.25	.25	.35	.30	.25	.25	.30	.35	.35	.40	.55	.50	.50	.50	.50
C							.50	.50																						

	A.M.							P.M.							3a.					A.M.										
A	6:27	6:53	7:56	8:56	9:56	10:56	11:56	12:56	1:56	2:56	3:56	4:56	5:56	6:56	7:56	8:56	9:56	10:56	11:56	12:56	1:56	2:56	3:56	4:56	5:56	6:56	7:56	8:56	9:56	10:56
B	.00	.05	.45	.40	.35	.55	.45	.45	.40	.60	.20	.40	.20	.20	.20	.20	.20	.20	.20	.35	.10	.25	.20	.20	.30	.30	.50	.40	.25	.45
B							.40	.50	.30	.30																				
C	.00		.45	.30	.05	1.05	.60	.45	.50	.45	.30	.30	.15	.25	.15	.25	.20	.25	.25	.20	.30	.10	.25	.35	.40	.70	.40	.40	.35	.40
C							.45	.50	.25	.35																				
															3b.															
B		.00	.05	.80	.03	.45	.25	.25	.40	.45	.30	.10	.10	.20	.10	.20	.10	.15	.10	.30	.10	.15	.20	.20	.20	.30	.50	.50	.40	.40
B							.50	.60	.30	.40																				
C			.20	.20	.30	.20	.45	.40	.35	.40	.15	.20	.15	.15	.10	.15	.15	.15	.20	.15	.15	.10	.20	.05	.60	.35	.45	.40	.45	.35
C							.60	.55	.30	.45																				

	A.M.				P.M.										4a.		A.M.												P.M.	
A	8:33	9:00	10:01	11:01	12:01	1:01	2:01	3:01	4:01	5:01	6:01	7:01	8:01	9:01	10:01	11:01	12:01	1:01	2:01	3:01	4:01	5:01	6:01	7:01	8:01	9:01	10:01	11:01	12:01	1:01
B	.00	.05	.05	.30	.30	.35	.45	.20	.30	.20	.15	.05	.20	.15	.05	.20	.20	.20	.30	.10	.10	.40	.20	.20	.20	.30	.20	.45	.15	.30
B							.10	.40																						
C	.00	.15	.25	.30	.40	.40	.25	.30	.25	.15	.15	.10	.15	.10	.20	.25	.15	.10	.25	.15	.20	.30	.10	.20	.20	.35	.30	.25	.25	.25
C							.20	.25																						
															4b.															
B		.00	.50	.30	.10	.20	.20	.20	.10	.10	.30	.10	.00	.00	.20	.05	.10	.00	.30	.10	.05	.15	.10	.10	.15	.05	.25	.05	.25	.15
B							.10	.35																						
C		.00	.25	.15	.25	.20	.15	.15	.20	.05	.10	.05	.10	.05	.10	.15	.15	.10	.10	.15	.10	.10	.00	.05	.10	.20	.15	.05	.20	.05
C							.15	.10																						

Inc|e Humidity Under Constant Light During the Day Period.

A	A.M. 6:18	55	11:55	A.M. 12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
B	.00	30	.10	.30	.30	.10	.30	.20	.10	.10	.10	.30	.30
C	.00	20	.20	.25	.20	.20	.25	.20	.20	.20	.20	.30	.40
B		15	.20	.20	.25	.30	.25	.15	.05	.10	.10	.30	.40
C		0	. 20	.20	.20	.20	.20	.20	.05	.10	.20	.15	.35

A	5:30	50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:3Ø
B	.00	05	.30	.30	.05	.25	.10	.20	.35	.15	.30	.35	.35	.35
C	.00	20	.20	.20	.20	.20	.15	.30	.10	.25	.30	.30	.25	.40
B		30	.10	.20	.40	.35	.35	.30	.30	.30	.30	.50	.25	.50
C		25	.30	.30	.25	.25	.30	.30	.20	.30	.40	.50	.30	.45

A	A.M. 5:45	:02	A.M. 12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02
B	.00	.10	.10	.30	.20	.20	.20	.20	.20	.30	.25	.25	.30
C	.00	.10	.20	.30	.10	.15	.15	.25	.20	.30	.25	.30	.25
B		.15	.20	.10	.20	.10	.10	.15	.25	.20	.25	.45	.25
C		.10	.15	.10	.15	.20	.15	.15	.20	.30	.25	.25	.25

A	A.M. 6:36	.M. 2:06	1:06	2:06	3:06	4:06	5:06	6:06	7:06
B	.00	.15	.10	.10	.10	.10	.10	.10	.15
C	.00	.10	.10	.10	.10	.10	.10	.05	.20
B		.15	.10	.20	.15	.20	.15	.20	.15
C		.20	.10	.15	.15	.20	.15	.15	.15

TABLE XXIV.

Increments of Absorption and Transpiration for Phaseolus Grown at 20°C. and 75 percent Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration.

	A.M.								P.M.												A.M.									
A	6:18	6:45	6:55	7:55	8:55	9:55	10:55	11:55	12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55	10:55	11:55	12:55	1:55	2:55	3:55	4:55	5:55	6:55	7:55	8:55	9:55
1a.																														
B	.00	.05	.00	.80	.40	.20	.40 .65	.10 .45	.40	.40	.40	.35	.35	.65	.25	.05	.30	.35	.30	.10	.30	.30	.10	.30	.20	.10	.10	.10	.30	.30
C	.00	.30	.10	.40	.30	.35	.25 .40	.35 .40	.40	.40	.45	.40	.40	.35	.25	.20	.30	.20	.20	.20	.25	.20	.20	.25	.20	.20	.20	.20	.30	.40
1b.																														
B		.00	.05	.20	.15	.40	.30 .65	.05 .45	.35	.20	.20	.35	.20	.15	.25	.20	.15	.15	.15	.20	.20	.25	.30	.25	.15	.05	.10	.10	.30	.40
C		.00	.05	.40	.20	.25	.20 .15	.20 .30	.15	.25	.25	.25	.20	.25	.15	.20	.20	.20	.20	. 20	.20	.20	.20	.20	.20	.05	.10	.20	.15	.35

2a.																															
A	5:30	5:50	6:50	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50
B	.00	.00	.50	.30	.30	.40	.20	.10	.35	.35	.35	.35	.30	.35	.25	.25	.05	.35	.05	.30	.30	.05	.25	.10	.20	.35	.15	.30	.35	.35	.35
C	.00	.15	.25	.30	.30	.25	.30	.30	.40	.30	.35	.35	.30	.35	.20	.20	.20	.15	.20	.20	.20	.20	.20	.15	.30	.10	.25	.30	.30	.25	.40
2b.																															
B		.00	.75	.35	.35	.40	.25	.40	.30	.30	.35	.45	.30	.35	.40	.25	.30	.30	.30	.10	.20	.40	.35	.35	.30	.30	.30	.30	.50	.25	.50
C		.00	.25	.40	.30	.35	.30	.30	.30	.35	.40	.40	.30	.40	.20	.30	.30	.25	.25	.30	.30	.25	.25	.30	.30	.20	.30	.40	.50	.30	.45

	A.M.							P.M.												A.M.										
3a.																														
A	5:45	6:02	7:02	8:02	9:02	10:02	11:02	12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02	11:02	12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02
B	.00	.00	.30	.50	.20	.35	.25	.30	.20	.30	.20	.25	.15	.25	.20	.20	.10	.25	.10	.10	.30	.20	.20	.20	.20	.20	.30	.25	.25	.30
C	.00	.10	.30	.35	.30	.25	.30	.30	.30	.25	.20	.25	.30	.15	.20	.15	.20	.20	.10	.20	.30	.10	.15	.15	.25	.20	.30	.25	.30	.25
3b.																														
B		.00	.20	.15	.20	.05	.15	.05	.20	.20	.10	.05	.20	.10	.10	.15	.10	.15	.15	.20	.10	.20	.10	.10	.15	.25	.20	.25	.45	.25
C		.00	.20	.15	.10	.15	.15	.15	.20	.05	.10	.15	.20	.10	.10	.20	.15	.10	.10	.15	.10	.15	.20	.15	.15	.20	.30	.25	.25	.25

	A.M.						P.M.												A.M.							
4a.																										
A	6:36	7:06	8:06	9:06	10:06	11:06	12:06	1:06	2:06	3:06	4:06	5:06	6:06	7:06	8:06	9:06	10:06	11:06	12:06	1:06	2:06	3:06	4:06	5:06	6:06	7:06
B	.00	.15	.15	.10	.10	.25	.10	.15	.20	.20	.20	.15	.05	.05	.15	.05	.10	.05	.15	.10	.10	.10	.10	.10	.10	.15
C	.00	.10	.10	.20	.10	.05	.25	.10	.20	.10	.10	.20	.10	.05	.05	.05	.15	.10	.10	.10	.10	.10	.10	.10	.05	.20
4b.																										
B		.00	.30	.30	.10	.05	.02	.35	.20	.15	.05	.10	.25	.15	.10	.10	.10	.10	.15	.10	.20	.15	.20	.15	.20	.15
C		.00	.30	.20	.15	.25	.15	.15	.15	.15	.15	.15	.05	.10	.15	.20	.20	.10	.20	.10	.15	.15	.20	.15	.15	.15

ed)

	A.M.			A.M.									
A	5:45	:57	11:57	12:57	1:57	2:57	3:57	4:57	5:57	6:57	7:57	8:57	9:57
B	.00	.25	.25	.00	.20	.20	.05	.20	.05	.20	.25	.10	.20
C	.00	.15	.10	.05	.15	.20	.10	.10	.15	.20	.25	.15	.10

B		.05	.30	.25	.30	.30	.30	.30	.50	.30	.30	.55	.35
C		.15	.25	.25	.35	.25	.30	.30	.35	.30	.40	.30	.30

	A.M.										
A	7:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02
B	.00	.20	.20	.20	.35	.20	.35	.40	.20	.40	.25
C	.00	.25	.30	.20	.30	.25	.25	.35	.40	.25	.20

5a.

A	A.M. 5:45	6:15	6:57	7:57	8:57	9:57	10:57	11:57	P.M. 12:57	1:57	2:57	3:57	4:57	5:57	6:57	7:57	8:57	9:57	10:57	11:57	A.M. 12:57	1:57	2:57	3:57	4:57	5:57	6:57	7:57	8:57	9:57
B	.00	.00	.20	.05	.35	.25	.30	.20	.05	.20	.20	.10	.20	.30	.10	.10	.25	.00	.25	.25	.00	.20	.20	.05	.20	.05	.20	.25	.10	.20
C	.00	.10	.05	.40	.15	.20	.20	.20	.10	.20	.20	.10	.15	.20	.20	.15	.20	.15	.15	.10	.05	.15	.20	.10	.10	.15	.20	.25	.15	.10

5b.

B		.00	.00	.25	.20	.15	.20	.30	.15	.15	.30	.15	.40	.30	.25	.30	.35	.25	.05	.30	.25	.30	.30	.30	.30	.50	.30	.30	.55	.35
C		.00	.20	.40	.20	.25	.20	.15	.15	.20	.30	.30	.30	.25	.15	.30	.30	.35	.15	.25	.25	.35	.25	.30	.30	.35	.30	.40	.30	.30

6b.

A	A.M. 7:02	8:02	9:02	10:02	11:02	P.M. 12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02	11:02	A.M. 12:02	1:02	2:02	3:02	4:02	5:02	6:02	7:02	8:02	9:02	10:02
B	.00	.40	.20	.30	.10	.10	.30	.20	.20	.20	.05	.25	.15	.20	.15	.30	.20	.35	.20	.20	.20	.35	.20	.35	.40	.20	.40	.25
C	.00	.30	.25	.25	.20	.15	.15	.20	.20	.10	.20	.20	.20	.15	.25	.20	.25	.30	.25	.30	.20	.30	.25	.25	.35	.40	.25	.20

Incr ve Humidity Under Constant Light During the Day Period.

A	A.M. 9:20	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	P.M. 12:50	1:50
B	.00	.05	.05	.05	.05	.30	.05	.05	.10	.10	.10	.20	.10
C	.00	.05	.05	.10	.10	.05	.05	.05	.05	.15	.10	.15	.15
B		.10	.20	.10	.10	.25	.05	.15	.20	.35	.10	.45	.30
C		.20	.05	.20	.10	.10	.20	.15	.20	. 25	.25	.40	.25

A	A.M. 9:55	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	P.M. 12:12	1:12	2:12
B	.00	.10	.05	.20	.10	.10	.10	.10	.20	.20	.20	.15	.15
C	.00	.15	.05	.15	.10	.10	.15	.15	. 20	.15	.20	.20	.20
B		.25	.15	.10	.30	.25	.25	.20	.25	.25	.30	.45	.35
C		.20	.15	.25	.20	.25	.20	.15	.30	.35	.35	.30	.35

A	A.M. 4:45	:12	11:12	A.M. 12:12	1:12	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12
B	.00	.20	.15	.00	.20	.20	.10	.15	.10	.10	.15	.30	.20
C	.00	.15	.10	.10	.20	.15	.10	.15	.10	.20	.15	.20	.30
B		.25	.30	.05	.30	.05	.20	.45	.10	.40	.30	.55	.30
C		.30	.10	.25	.15	.30	.40	.40	.25	.35	.35	.35	.40

A	A.M. 6:24	1:15	A.M. 12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15
B	.00	.05	.05	.15	.05	.15	.10	.15	.10	.30	.20	.30
C	.00	.15	.15	.10	.10	.10	.15	.05	.15	.15	.25	.15
B		.05	.25	.10	.30	.25	.05	.25	.30	.25	.35	.30
C		.25	.20	.20	.15	.20	.25	.65	.35	.20	.30	.25

T A B L E   X X V.

Increments of Absorption and Transpiration for Phaseolus Grown at 15°C. and 75 Percent. Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration.

	A.M.				P.M.										1a.		A.M.												P.M.	
A	9:20	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50	5:50	6:50	7:50	8:50	9:50	10:50	11:50	12:50	1:50
B	.00	.45	.00	.05	.30	.20	.00 .10	.10 .20	.20 .20	.10	.10	.30	.10	.05	.05	.10	.10	.00	.05	.05	.05	.05	.30	.05	.05	.10	.10	.10	.20	.10
C	.00	.40	.05	.10	.15	.20	.25 .15	.05 .10	.20 .20	.10	.20	.10	.10	.20	.05	.00	.15	.10	.05	.05	.10	.10	.05	.05	.05	.05	.15	.10	.15	.15
															1b.															
B		.00	.25	.20	.40	.70	.55 .35	.15 .25	.35 .30	.05	.25	.10	.10	.15	.25	.10	.25	.10	.10	.20	.10	.10	.25	.05	.15	.20	.35	.10	.45	.30
C		.00	.40	.50	.50	.40	.60 .35	.20 .25	.25 .25	.15	.25	.10	.20	.20	.15	.15	.25	.10	.20	.05	.20	.10	.10	.20	.15	.20	. 25	.25	.40	.25

	A.M.			P.M.											2a.	A.M.												P.M.		
A	9:55	10:25	11:12	12:12	1:12	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12	1:12	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12	1:12	2:12
B	.00		.45	.40	.20	.20	.00 .25	.25 .25	.15 .20	.20	.10	.10	.15	.15	.10	.10	.10	.15	.10	.05	.20	.10	.10	.10	.10	.20	.20	.20	.15	.15
C	.00		.45	.15	.10	.20	.15 .15	.40 .15	.15 .15	.15	.10	.10	.10	.10	. 10	.10	.10	.10	.15	.05	.15	.10	.10	.15	.15	. 20	.15	.20	.20	.20
															2b.															
B		.00	.40	.60	.20	.20	.35 .30	.20 .30	.15 .40	.20	.20	.10	.10	.25	.05	. 15	.25	.15	.25	.15	.10	.30	.25	.25	.20	.25	.25	.30	.45	.35
C		.00	.95	.15	.10	.30	.15 .30	.30 .20	.30 .45	.20	.20	.10	.10	.15	.15	.20	.25	.25	.20	.15	.25	.20	.25	.20	.15	.30	.35	.35	.30	.35

	A.M.								P.M.						3a.						A.M.									
A	4:45	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12	1:12	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12	1:12	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12
B	.00	.00	.25	.15	.05	.15	.30	.15	.15	.15	.10	.30	.25	.10	.20	.20	.10	.05	.20	.15	.00	.20	.20	.10	.15	.10	.10	.15	.30	.20
C	.00	.05	.10	.15	.10	.15	.25	.10	.15	.25	.20	.20	.15	.20	.15	.10	.15	.15	.15	.10	.10	.20	.15	.10	.15	.10	.20	.15	.20	.30
															3b.															
B		.00	.00	.00	.05	.15	.30	.35	.05	.25	.30	.35	.10	.20	.15	.10	.15	.05	.25	.30	.05	.30	.05	.20	.45	.10	.40	.30	.55	.30
C		.00	.10	.30	.30	.10	.25	.20	.20	.25	.25	.25	.25	.20	.20	.15	.20	.15	.30	.10	.25	.15	.30	.40	.40	.25	.35	.35	.35	.40

	A.M.							P.M.							4a.					A.M.									
A	6:24	6:45	7:15	8:15	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15
B	.00	.00	.00	.25	.25	.30	.30	.20	.05	.25	.20	.25	.05	.20	.10	.15	.25	.10	.05	.05	.15	.05	.15	.10	.15	.10	.30	.20	.30
C	.00	.00	.20	.25	.20	.20	.15	.20	.20	.15	.20	.25	.15	.10	.15	.15	.30	.20	.15	.15	.10	.10	.10	.15	.05	.15	.15	.25	.15
															4b.														
B		.00	.00	.00	.30	.35	.35	.05	.25	.05	.05	.20	.10	.30	.00	.05	.25	.30	.05	.25	.10	.30	.25	.05	.25	.30	.25	.35	.30
C		.00		.50	.40	.30	.20	.20	.15	.10	.15	.20	.20	.10	.15	.25	.55	.20	.25	.20	.20	.15	.20	.25	.65	.35	.20	.30	.25

Incrve Humidity Under Constant Light During the Day Period.

	A.M.		A.M.										
A	6:45	[illegible]:10	12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10
B	.00	.20	.05	.20	.05	.20	.05	.20	.05	.20	.30	.45	.30
B													
C	.00	.15	.10	.15	.10	.10	.15	.15	.15	.10	.40	.40	.35
C													
B		.05	.30	.15	.30	.35	.30	.30	.35	.25	.50	.45	.50
B													
C		.10	.20	.30	.25	.25	.30	.35	.30	.35	.35	.45	.45
C													

	A.M.												P.M.
A	8:12	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15	10:15	11:15	12:15
B	.00	.40	.05	.25	.20	.10	.15	.25	.35	.30	.40	.35	.40
B													
C	.00	.20	.20	.20	.20	.20	.15	.15	.25	.40	.55	.50	.40
C													
B		.40	.10	.50	.40	.20	.55	.55	.60	.50	.60	.50	.60
B													
C		.30	.30	.40	.40	.35	.50	.60	.50	.50	.55	.50	.50
C													

TABLE XXVI.

Increments of Absorption and Transpiration for Phaseolus Grown at 15°C. and 25 Percent. Relative Humidity Under Constant Light During the Day Period.

A - Time
B - Increment of Absorption
C - Increment of Transpiration.

1a.

A	A.M. 6:45	7:10	7:35	8:10	9:10	10:10	11:10	P.M. 12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10	11:10	A.M. 12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10
B	.00	.05	.00	.25	.50	.20	.40	.05	.25	.20	.25	.30	.25	.20	.25	.20	.20	.05	.20	.05	.20	.05	.20	.05	.20	.05	.20	.30	.45	.30
B							.50	.25	.20	.40	.60	.20	.45																	
C	.00	.40	.05	.15	.40	.30	.25	.25	.20	.30	.20	.30	.25	.15	.30	.10	.15	.10	.15	.10	.15	.10	.10	.15	.15	.15	.10	.40	.40	.35
C							.30	.35	.40	.30	.35	.35	.30																	

1b.

A	7:10	7:35	8:10	9:10	10:10	11:10	12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10	11:10	12:10	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10	9:10	10:10
B	.00	.00	.10	.40	.60	.45	.15	.25	.25	.20	.10	.20	.10	.35	.15	.10	.15	.05	.30	.15	.30	.35	.30	.30	.35	.25	.50	.45	.50
B						.30	.50	.50	.40	.45	.40	.50																	
C	.00	.03	.40	.60	.55	.35	.35	.20	.25	.20	.15	.20	.15	.20	.20	.20	.10	.10	.20	.30	.25	.25	.30	.35	.30	.35	.35	.45	.45
C						.45	.40	.45	.45	.50	.40	.40																	

2a.

A	A.M. 8:12	8:50	9:15	10:15	11:15	P.M. 12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15	10:15	11:15	A.M. 12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15	10:15	11:15	P.M. 12:15
B	.00	.20	.20	.35	.30	.30	.10	.20	.10	.30	.20	.15	.20	.35	.20	.10	.25	.15	.40	.05	.25	.20	.10	.15	.25	.35	.30	.40	.35	.40
B							.50	.50	.30	.55	.35																			
C	.00	.70	.10	.30	.35	.10	.20	.10	.20	.20	.25	.25	.20	.35	.15	.15	.20	.20	.20	.20	.20	.20	.20	.15	.15	.25	.40	.55	.50	.40
C							.50	.50	.50	.45	.45																			

2b.

A	8:50	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15	9:15	10:15	11:15	12:15
B	.00	.10	.60	.55	.55	.60	.20	.10	.15	.45	.10	.10	.30	.15	.10	.35	.30	.40	.10	.50	.40	.20	.55	.55	.60	.50	.60	.50	.60
B						.40	.45	.55	.50	.50																			
C	.00	.60	1.00	.60	.45	.35	.30	.25	.25	.20	.25	.20	.25	.15	.20	.30	.35	.30	.30	.40	.40	.35	.50	.60	.50	.50	.55	.50	.50
C						.50	.60	.50	.50	.50																			

E X X V I I .

RY OF TABLES.

		Transpiration Young Plants	Absorption Young Plants	Transpiration Old Plants	Absorption
Table XXI. (35°C. 75% R.H.) (light constant)	1a,1b	25.35	25.05	32.70	3
	2a,2b	21.05	20.95	22.15	2
	3a,3b	16.70	17.65	23.60	2
	4a,4b	18.80	18.85	36.10	3
Average					
Table XXII. (30°C. 75% R.H.) (light constant)	2a,2b	5.45	5.65	6.10	
	1a,1b	9.05	8.10	9.85	
	3a,3b	4.40	4.55	7.05	
	4a,4b	5.70	5.60	5.30	
Average					
Table XXIII. (25°C. 75% R.H.) (light constant)	1a,1b	5.90	5.70	7.45	
	2a,2b	5.20	5.10	8.55	
	4a,4b	5.25	5.25	3.00	
	3a,3b	8.10	7.30	5.90	
Average					
Table XXIV. (20°C. 75% R.H.) (light constant)	1a,1b	6.55	6.70	4.75	
	2a,2b	6.05	6.00	7.55	
	3a,3b	5.25	5.30	3.75	
	4a,4b	2.75	2.95	3.85	
	5a,5b	3.70	3.90	6.45	
	6b			5.30	
Average					
Table XXV. (15°C. 75% R.H.) (light constant)	1a,1b	2.55	2.50	5.10	
	2a,2b	3.35	3.30	5.20	
	3a,3b	3.95	3.90	5.70	
	4a,4b	3.90	3.90	5.35	
Average					
Table XXVI. (15°C. 25% R.H.) (light constant)	1a,1b	4.80	4.65	6.40	
	2a,2b	5.15	5.30	8.75	

TABLE XXVII.

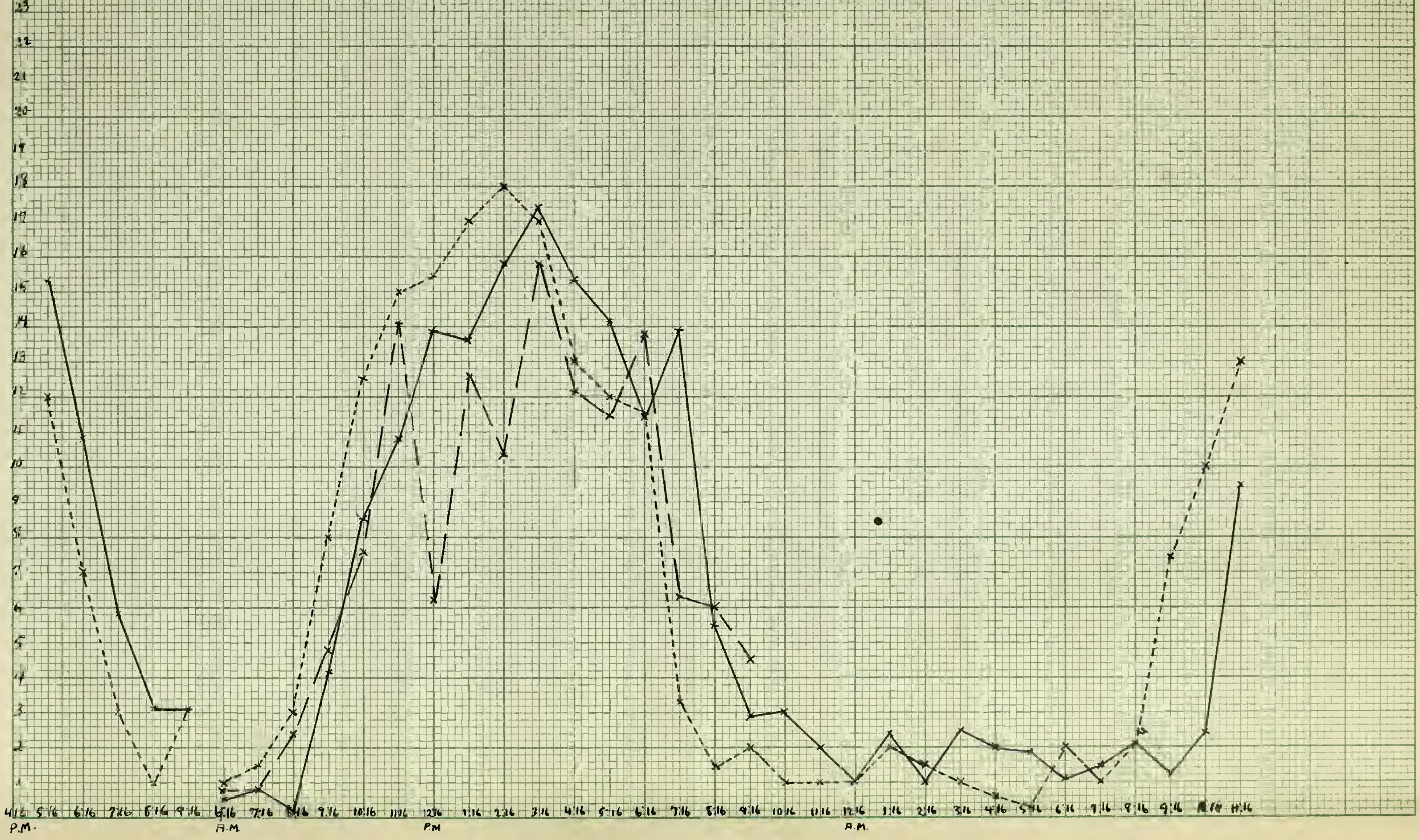
SUMMARY OF TABLES.

Table	Plants	Transpiration Young Plants	Absorption Young Plants	Transpiration Old Plants	Absorption Old Plants	Leaf Area Young	Leaf Area Old	Trans. per sq. inch Young	Trans. per sq. inch Old	Time Interval
										A.M.-A.M.
Table XVI. (35°C. 45% R.H.) (light constant)	1a,1b	16.20	16.05			22.82		.70	.	9:15-9:15
	2a,2b	16.75	16.70	48.80	47.25	21.49	47.00	.77	1.03	8:15-8:15
	3a,3b	16.25	15.60	43.45	43.20	21.48	47.97	.75	.90	8:55-8:55
	4a,4b	11.95	11.80	30.25	30.25	18.37	38.94	.65	.77	9:50-9:50
Average								.71	.90	
Table XVII. (30°C. 45% R.H.) (light constant)	1a,1b	8.20	8.00	17.90	17.15	16.66	37.26	.49	.48	9:52-9:52
	2a,2b	12.60	12.80	15.95	15.75	20.07	40.28	.62	.39	9:55-9:55
	3a,3b	12.90	12.70	17.70	17.60	24.47	43.80	.52	.40	8:07-8:07
	4a,4b	13.45	14.05	11.90	11.60	25.82	38.67	.52	.30	9:02-9:02
Average								.53	.39	
Table XVIII. (25°C. 45% R.H.) (light constant)	1a,1b	8.70	8.60	11.00	11.50	25.00	39.25	.34	.28	8:50-8:50
	3a,3b	6.45	6.30	12.50	11.90	24.96	39.68	.25	.31	9:22-9:22
	2a,2b	7.20	7.20	16.05	15.85	20.63	41.25	.34	.38	9:27-9:27
	4a,4b	6.40	6.25	7.50	7.20	21.05	34.87	.26	.21	9:05-9:05
	5a,5b	5.20	4.80	11.00	10.90	20.15	35.03	.25	.28	1:27 P.M.-1:27P.M.
Average								.29	.29	
										A.M.-A.M.
Table XIX. (20°C. 45% R.H.) (light constant)	1a,1b	6.80	6.70	11.25	11.25	25.26	40.14	.26	.28	9:33-9:33
	2a,2b	6.15	6.50	12.10	12.10	22.66	32.25	.27	.37	9:27-9:27
	3a,3b	6.80	6.45	10.85	10.65	22.48	39.96	.30	.27	9:20-9:20
	4a,4b	6.45	6.60	9.60	9.50	25.21	38.59	.25	.24	9:20-9:20
Average								.27	.29	
Table XX. (15°C. 45% R.H.) (light constant)	1a,1b	5.55	5.55	7.95	8.25	23.25	32.03	.23	.24	9:03-9:03
	2a,2b	5.55	5.50	8.25	8.50	22.05	33.02	.24	.24	12:30 P.M.-12:30P.M.
	3a,3b	5.35	5.20	9.25	9.70	18.02	40.15	.27.	.23	8:00-8:00
	4a,4b	4.15	4.50	7.05	7.40	17.22	23.73	.22	.20	10:05-10:05
	5a,5b	6.00	5.75	8.20	8.45	24.11	34.40	.24	.23	9:10-9:10
Average								.25	.22	
										A.M.-A.M.
Table XXI. (35°C. 75% R.H.) (light constant)	1a,1b	25.35	25.05	32.70	32.60	19.90	30.42	1.27	1.07	9:00-9:00
	2a,2b	21.05	20.95	22.15	22.85	23.02	34.60	.91	.64	9:07-9:07
	3a,3b	16.70	17.65	23.60	24.75	30.13	41.30	.55	.57	9:58-9:58
	4a,4b	18.80	18.85	36.10	36.35	22.26	45.26	.84	.79	9:07-9:07
Average								.89	.76	
Table XXII. (30°C. 75% R.H.) (light constant)	2a,2b	5.45	5.65	6.10	6.40	21.35	40.10	.25	.15	9:50-9:50
	1a,1b	9.05	8.10	9.85	9.60	19.85	39.49	.41	.24	9:55-9:50
	3a,3b	4.40	4.55	7.05	7.35	23.77	42.81	.18	.16	9:27-9:27
	4a,4b	5.70	5.60	5.30	5.70	26.85	41.72	.21	.12	9:22-9:22
Average								.26	.16	
Table XXIII. (25°C. 75% R.H.) (light constant)	1a,1b	5.90	5.70	7.45	7.40	23.54	38.30	.25	.19	9:22-9:22
	2a,2b	5.20	5.10	8.55	8.80	24.46	44.87	.21	.19	9:30-9:30
	4a,4b	5.25	5.25	3.00	3.60	23.44	35.92	.22	.083	9:01-9:01
	3a,3b	8.10	7.30	5.90	6.00	24.08	32.05	.33	.15	9:56-9:56
Average								.25	.15	
Table XXIV. (20°C. 75% R.H.) (light constant)	1a,1b	6.55	6.70	4.75	4.85	28.36	44.61	.23	.10	9:55-9:55
	2a,2b	6.05	6.00	7.55	7.60	25.85	39.72	.23	.19	9:50-9:50
	3a,3b	5.25	5.30	3.75	3.75	21.56	36.04	.24	.10	9:02-9:02
	4a,4b	2.75	2.95	3.85	3.90	16.50	37.15	.16	.10	7:06-7:06
	5a,5b	3.70	3.90	6.45	6.85	24.26	43.64	.15	.14	9:57-9:57
	6b			5.30	5.30		35.40		.15	10:02-10:02
Average								.20	.13	
Table XXV. (15°C. 75% R.H.) (light constant)	1a,1b	2.55	2.50	5.10	5.05	16.56	39.15	.15	.13	11:50-11:50
	2a,2b	3.35	3.30	5.20	4.90	18.32	35.21	.18	.14	12:12 P.M.-12:12 P.M.
	3a,3b	3.95	3.90	5.70	5.80	21.02	39.46	.18	.14	9:12-9:12
	4a,4b	3.90	3.90	5.35	4.75	19.61	35.86	.19	.14	9:16-9:16
Average								.17	.13	
Table XXVI. (15°C. 25% R.H.) (light constant)	1a,1b	4.80	4.65	6.40	6.35	17.70	32.02			9:10-9:10
	2a,2b	5.15	5.30	8.75	8.30	19.59	38.70			9:15-9:15

PLATE I.

Phaseolus.

The curves are plotted from the increments given in Table I.



P L A T E I I.

<u>Phaseolus</u>.

The curves are plotted from the increments given in Table II.

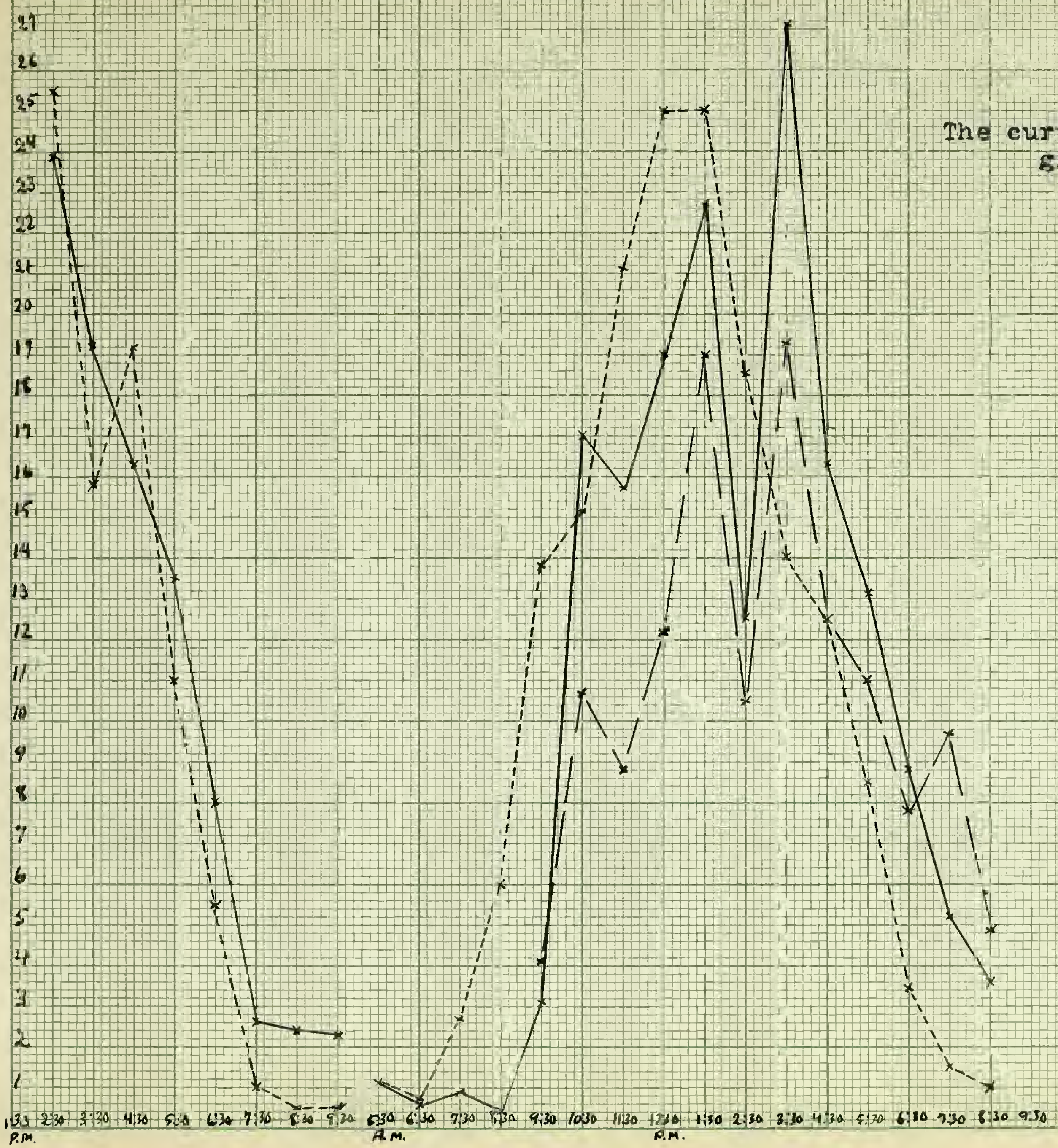
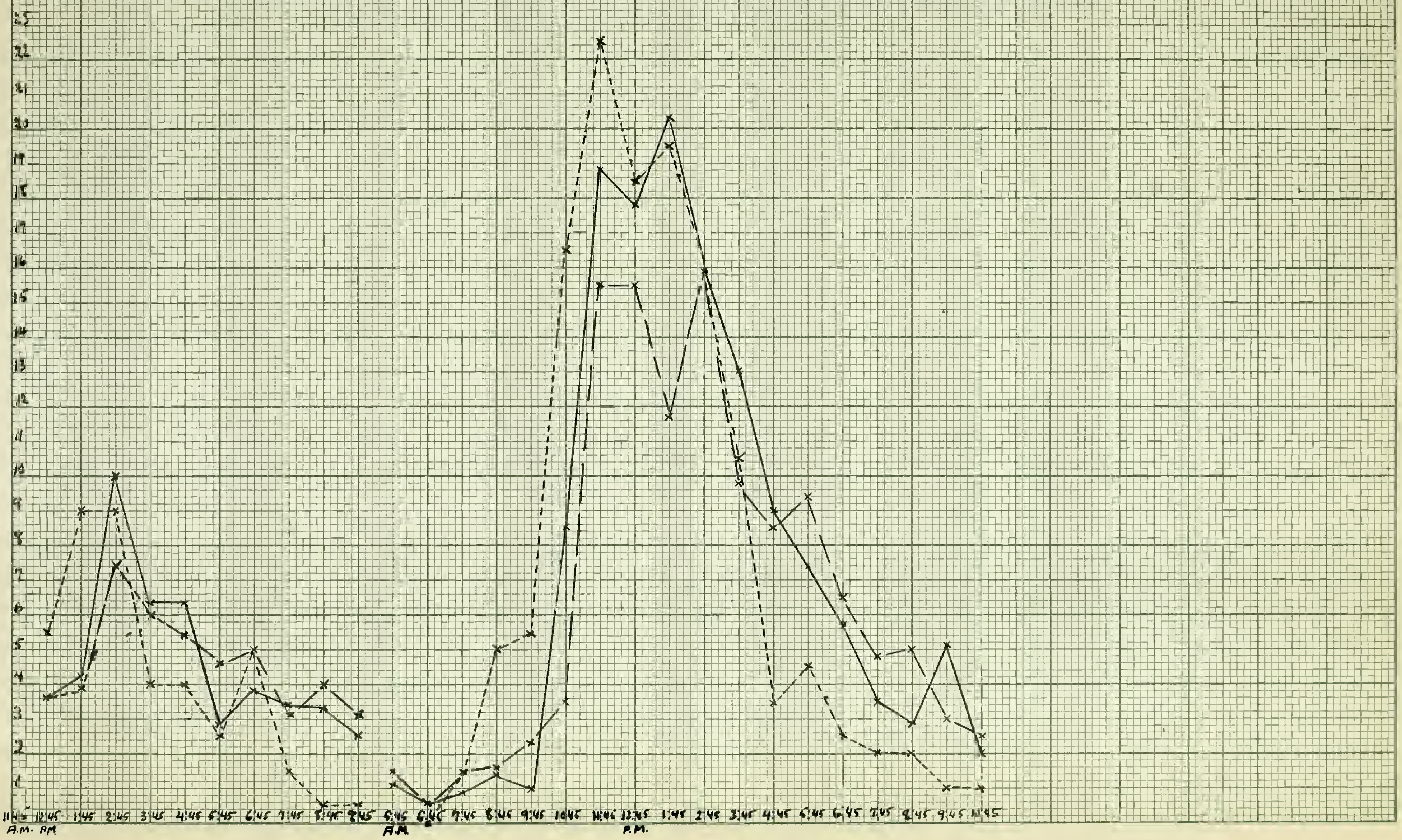


PLATE III

Phaseolus.

The curves are plotted from the increments given in Table III.



P L A T E I V.

Mays

The curves are plotted from the increments given in Table IV. The evaporimeter curve is identical with that of Plate I.

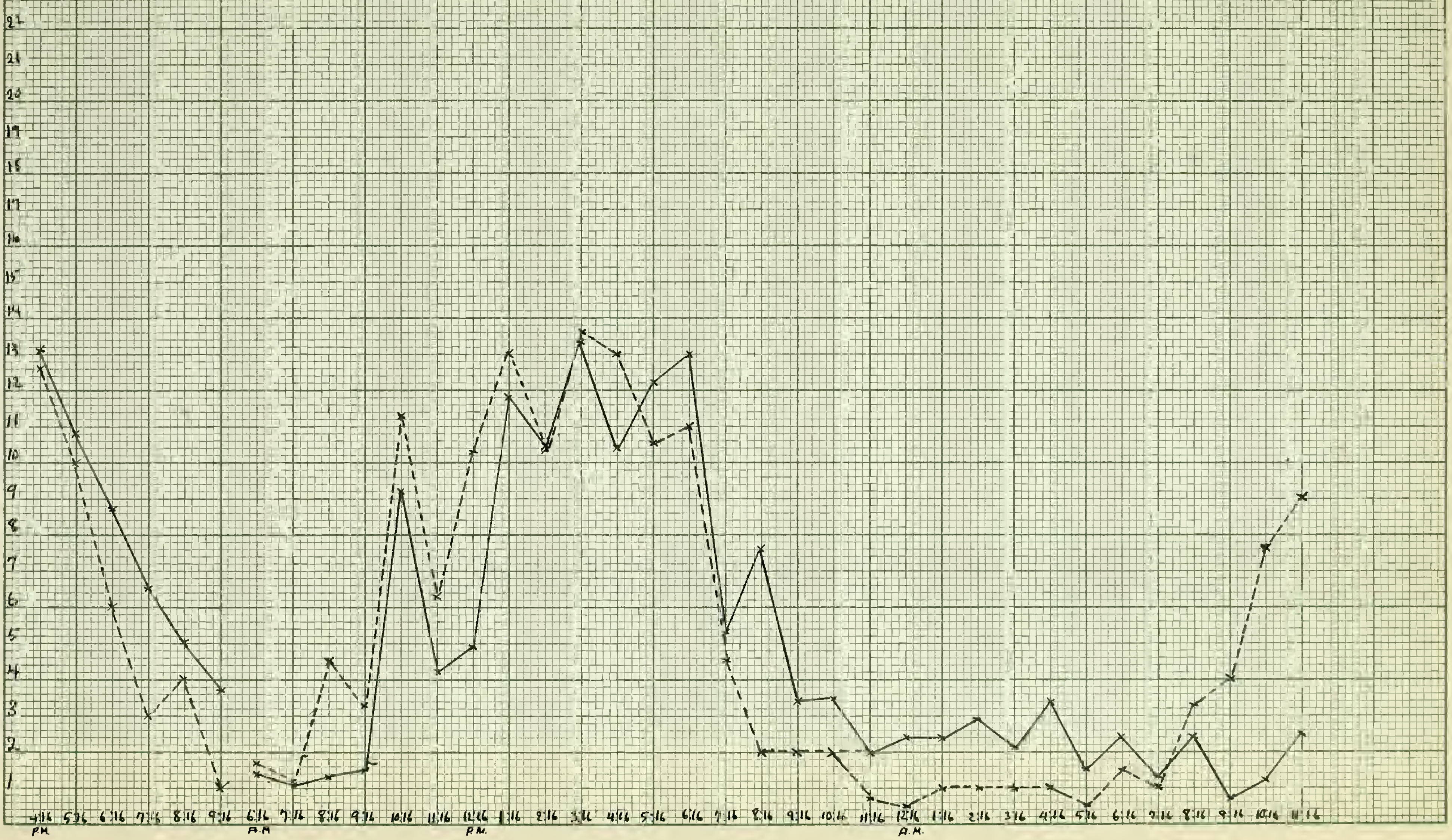


PLATE V.

Mays

The curves are plotted from the increments given in Table V. The evaporimeter curve is identical with that of Plate III.

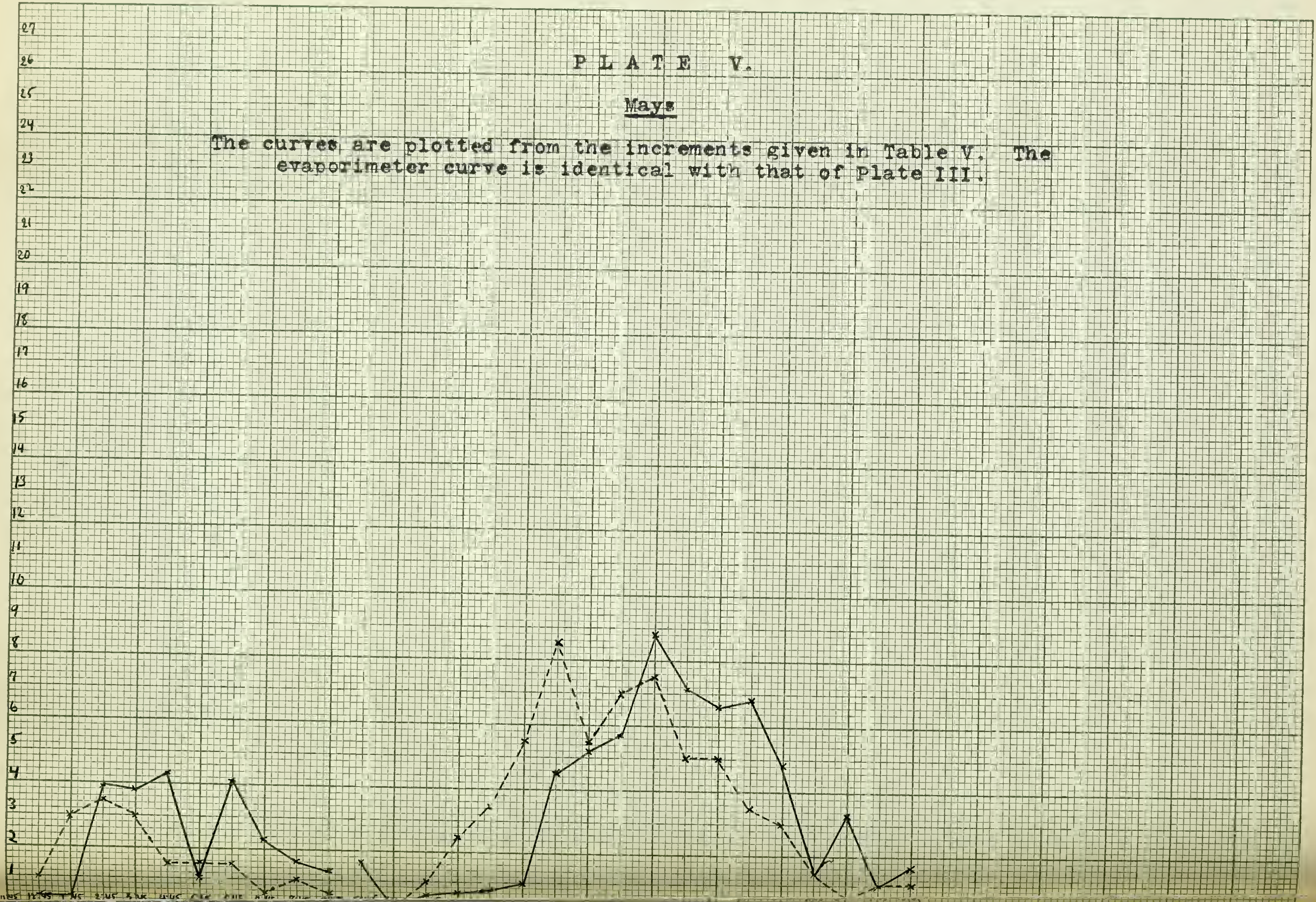
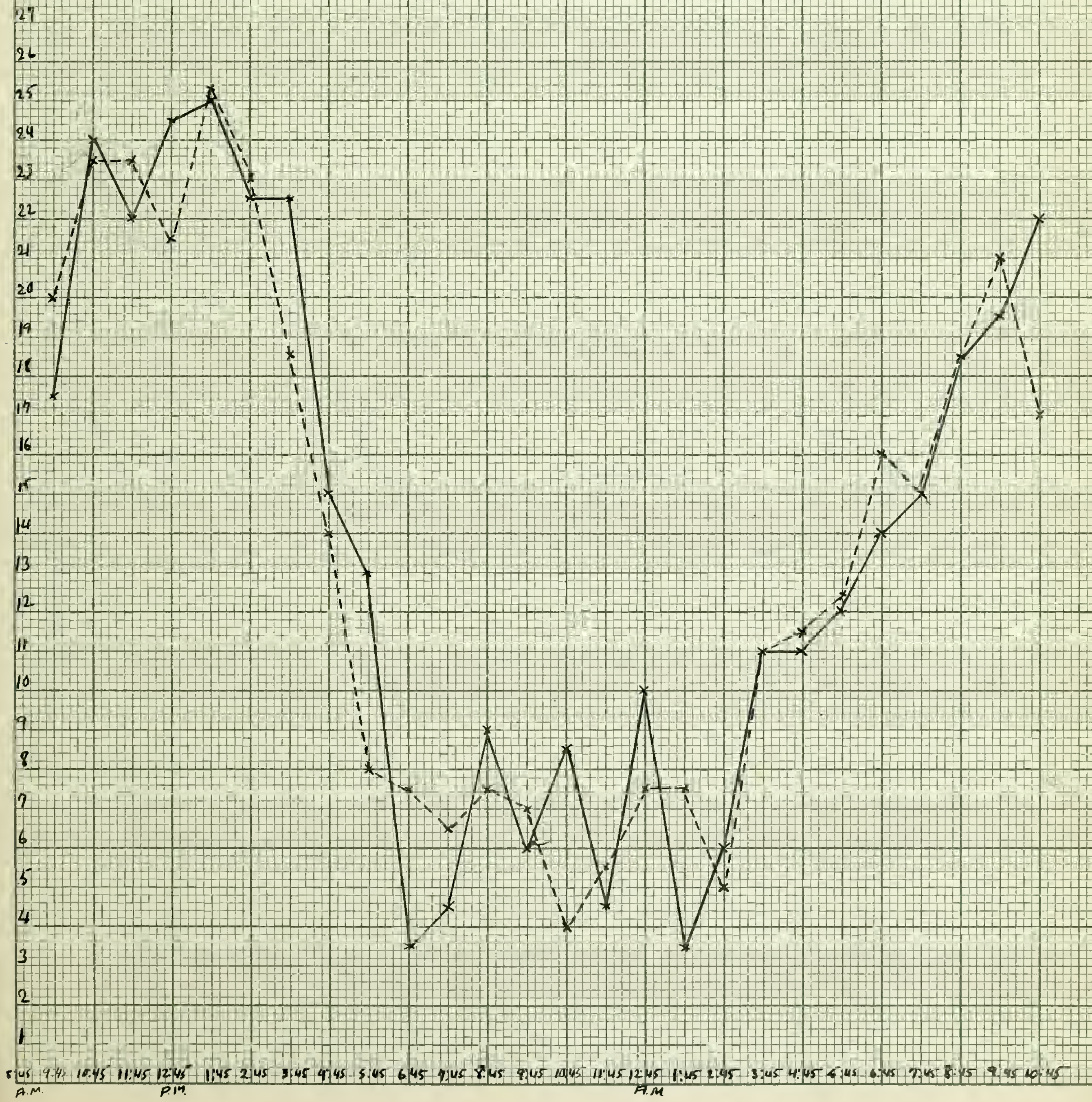


PLATE VI.

Phaseolus.

The curves are plotted from the increments given in Table VI,1a. The evaporimeter curve is identical with that of Plate VII. Plates VI and VII should be compared to show the difference between the day and night transpiration of young and old plants of phaseolus.



P L A T E   V I I.

Phaseolus.

The curves are plotted from the increments given in Table VI, lb. This plate should be compared with Plate VI to show the difference in the course of transpiration between young and old plants of Phaseolus.

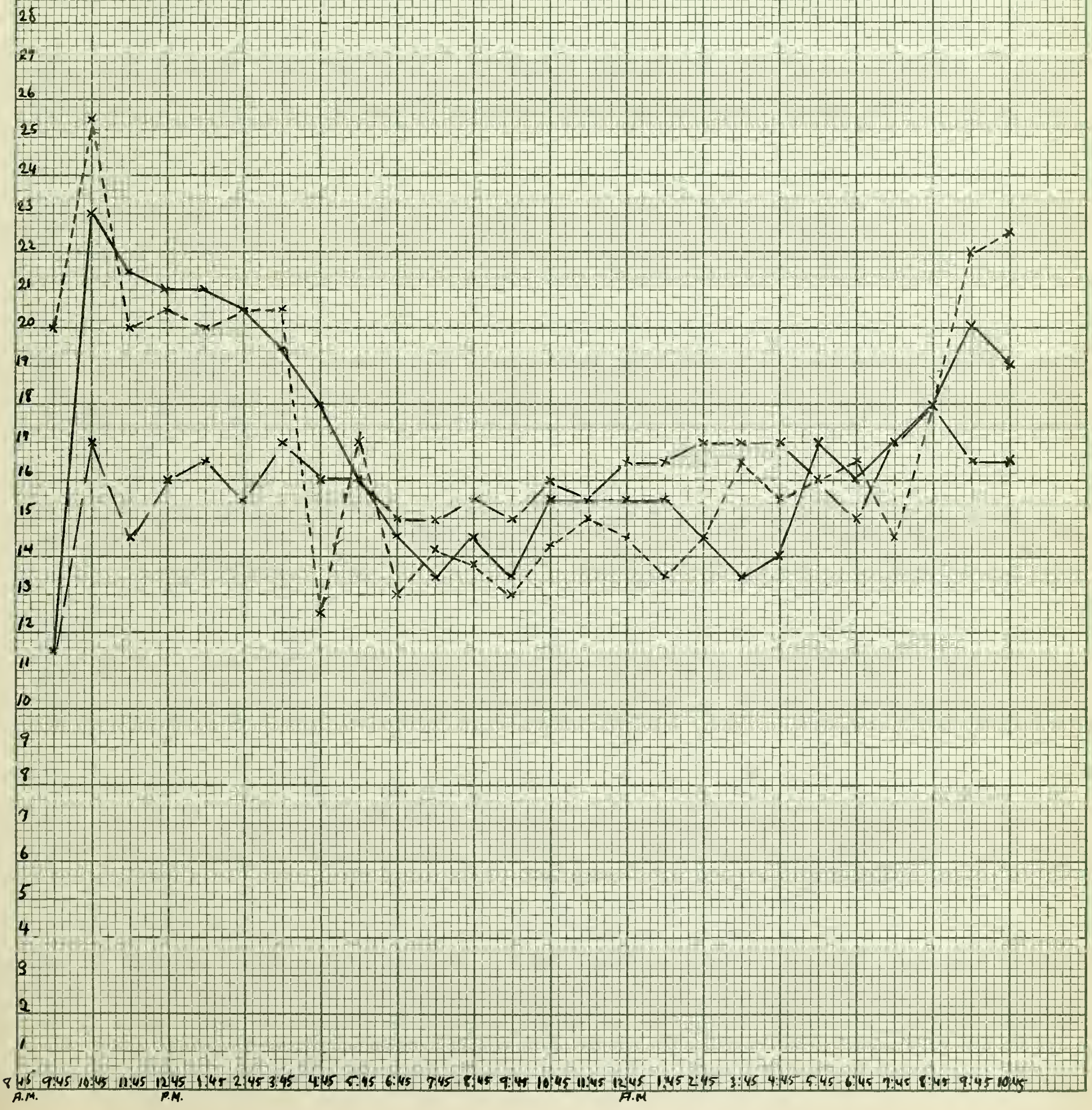
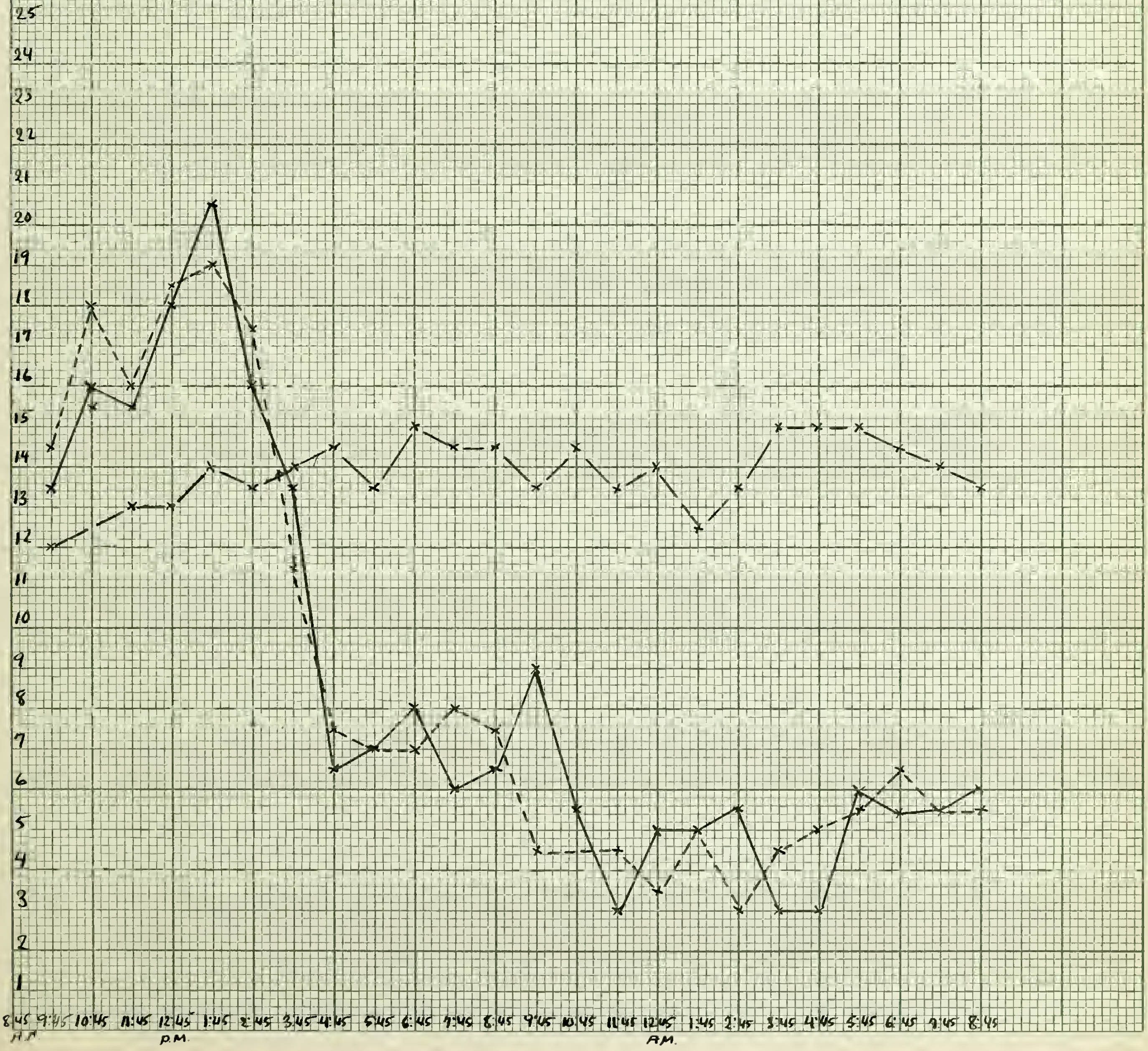


PLATE VIII.

Phaseolus.

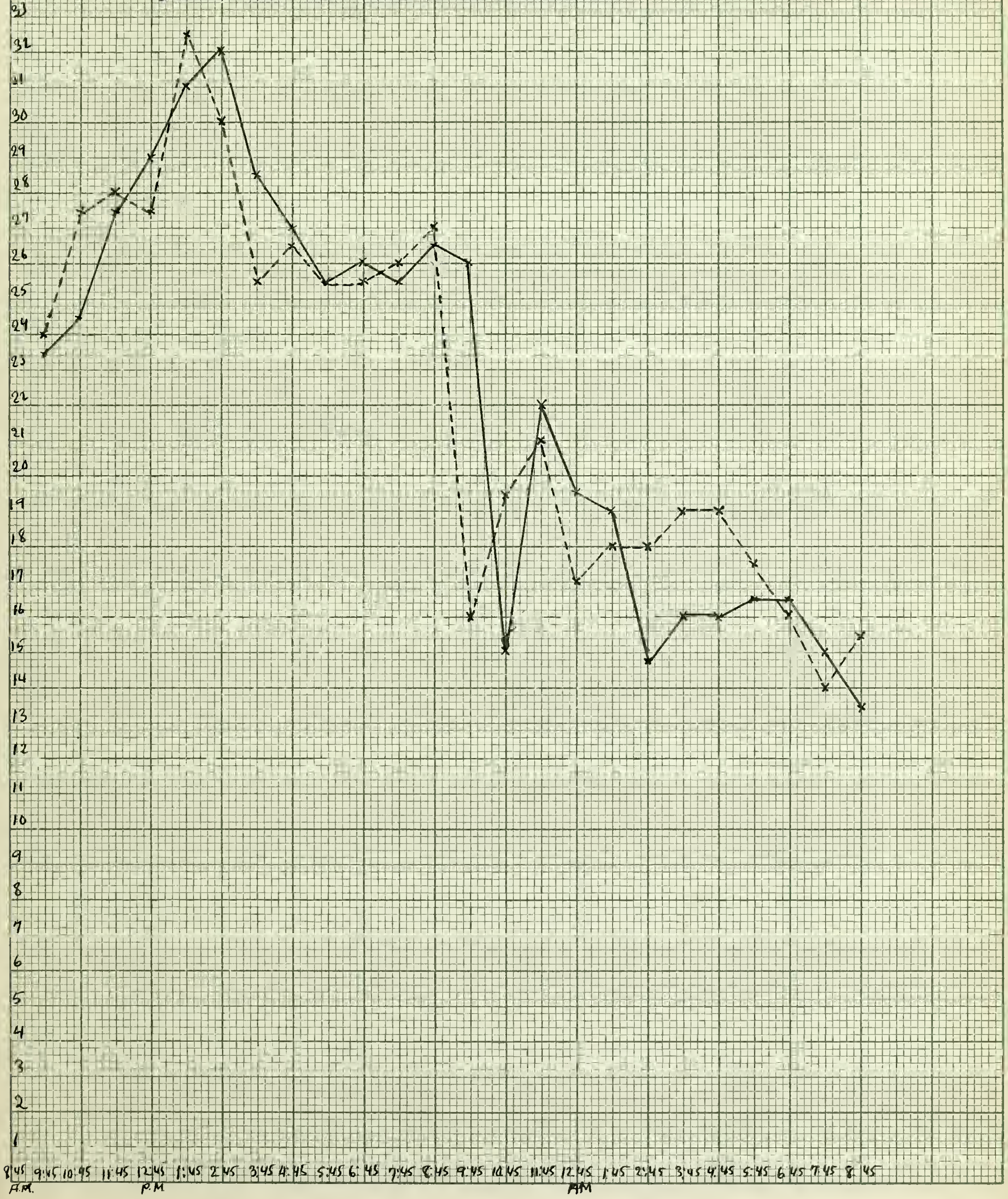
The curves are plotted from the increments given in Table VII.la. Plates VIII and IX should be compared to show the difference in the course of transpiration between young and old plants of Phaseolus.



P L A T E I X.

Phaseolus.

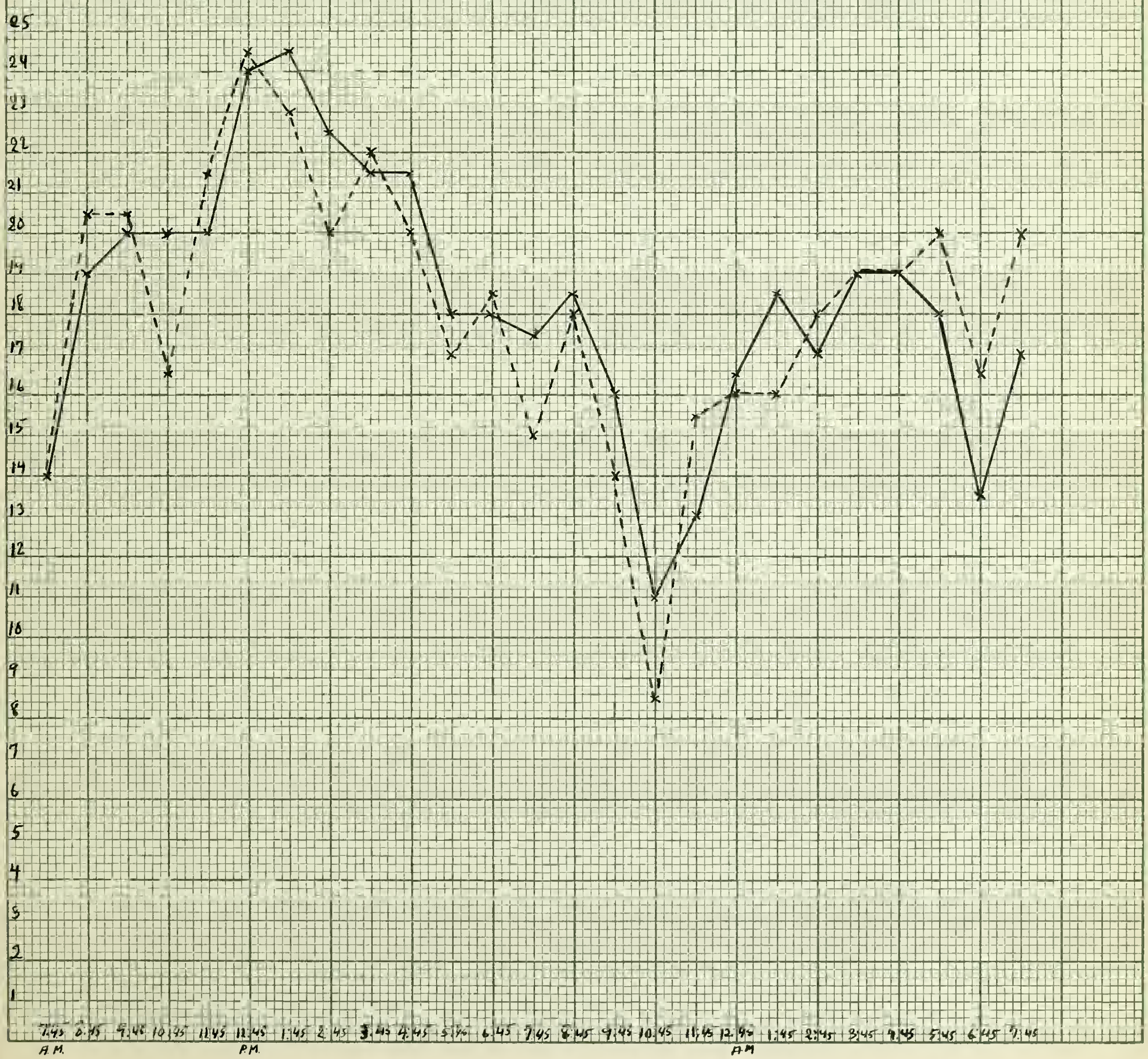
The curves are plotted from the increments given in Table VII,lb. Plates VIII and IX should be compared to show the difference in the course of transpiration between young and old plants of Phaseolus.



P L A T E X.

Phaseolus.

The curves are plotted from the increments given in Table VIII.2b. The effect of an 8°C. drop in temperature during the night should be noted.



P L A T E   X I.

Phaseolus.

The curves are plotted from the increments given in Table VIII, 1b. The effect of an 8°C. drop in temperature during the night should be noted.

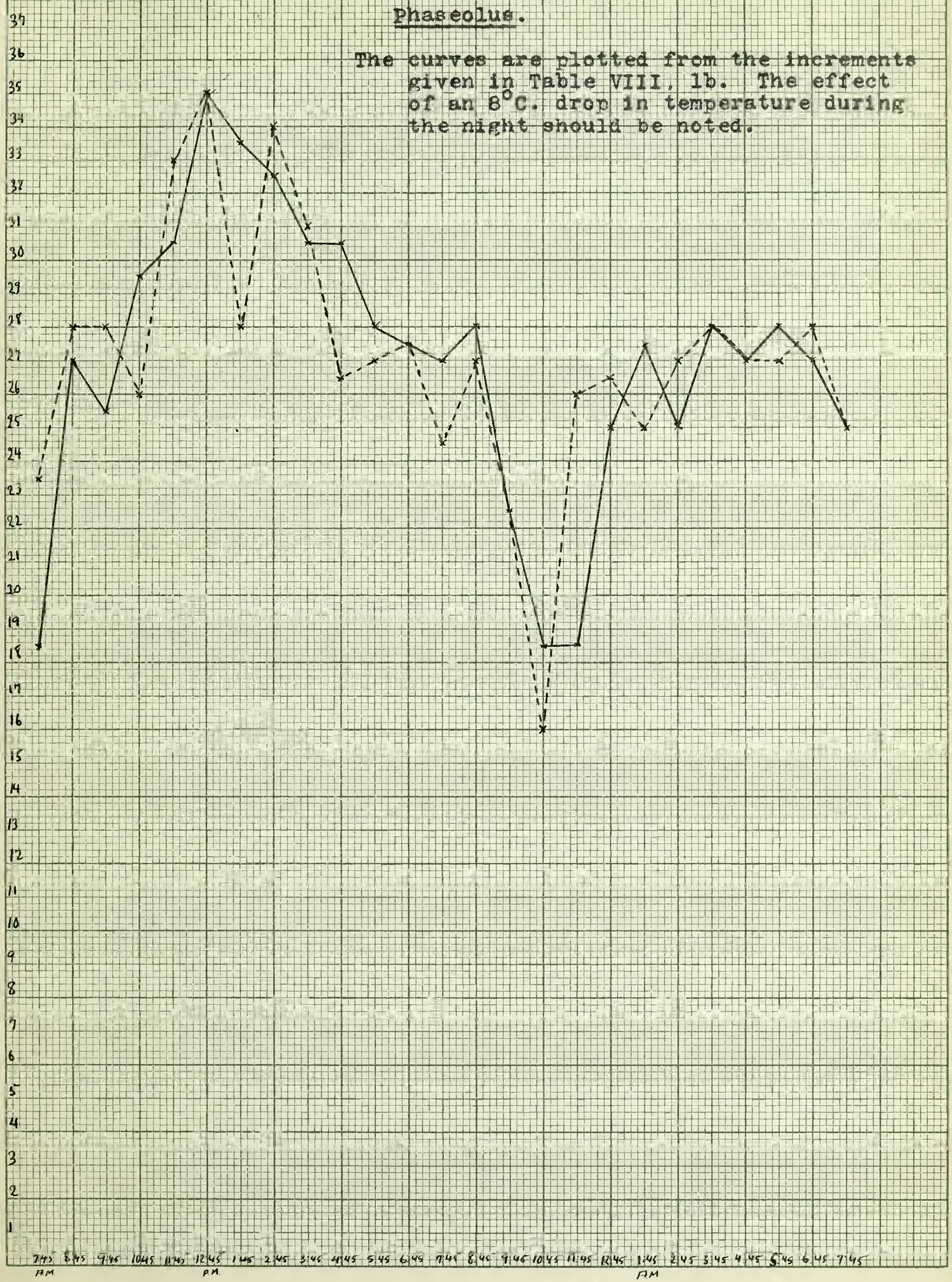


PLATE XII.

Mays.

The curves are plotted from the increments given in Table XIII, 1a. The curves of transpiration and absorption given by this very young stage of mays plants should be compared with the curves of the older stages given on Plates XIII, XIV, and XV.

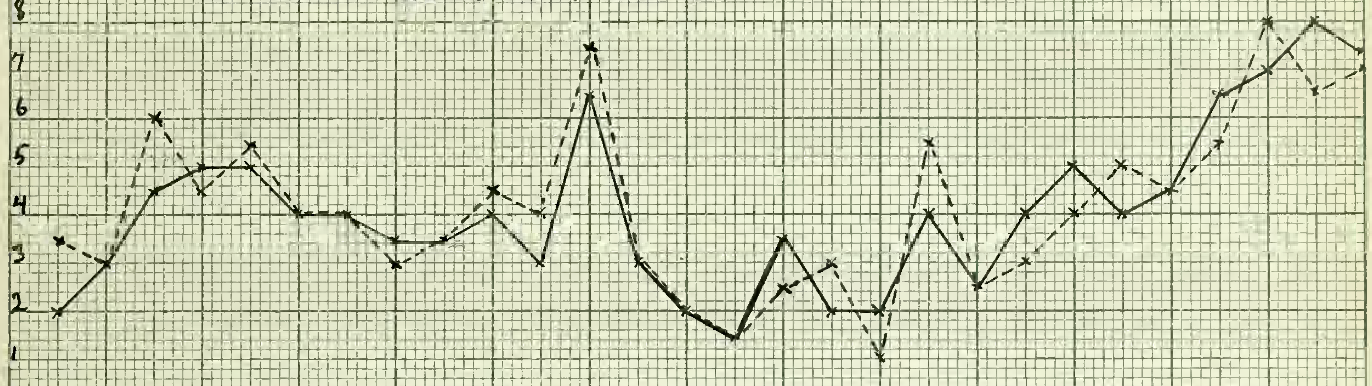
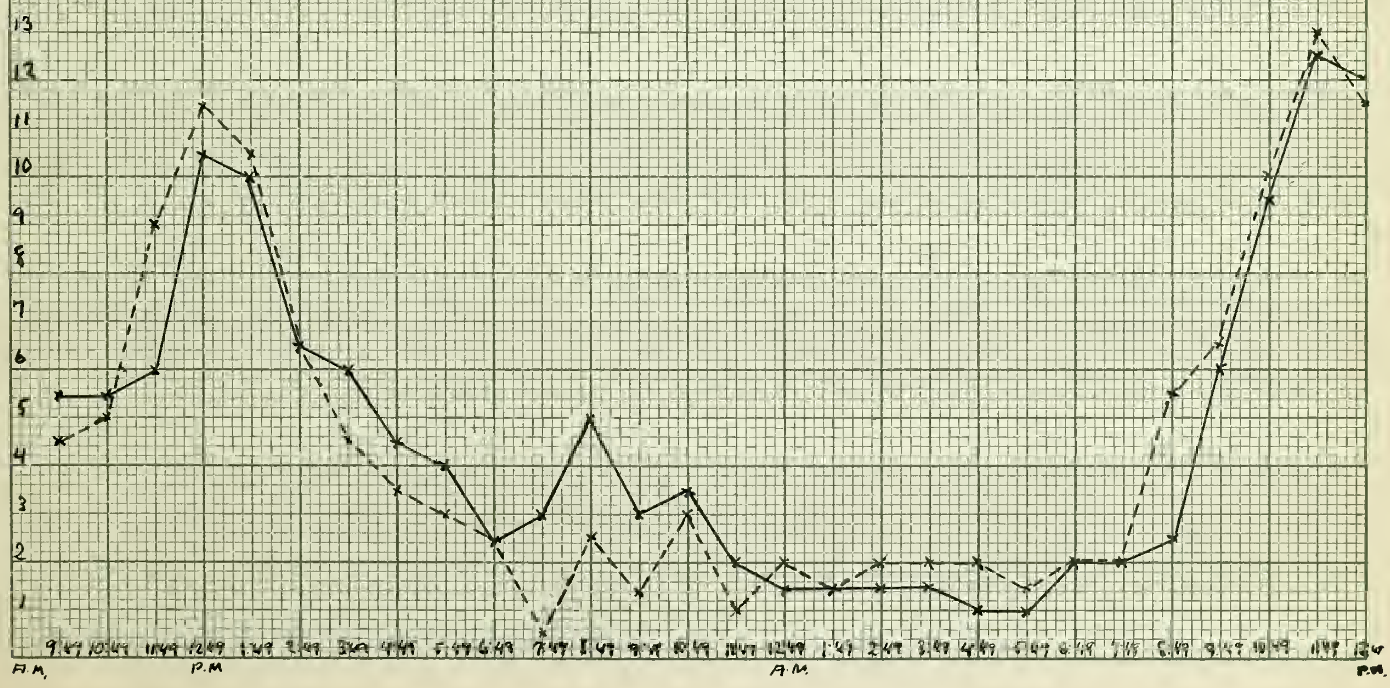


PLATE XIII.

Mays.

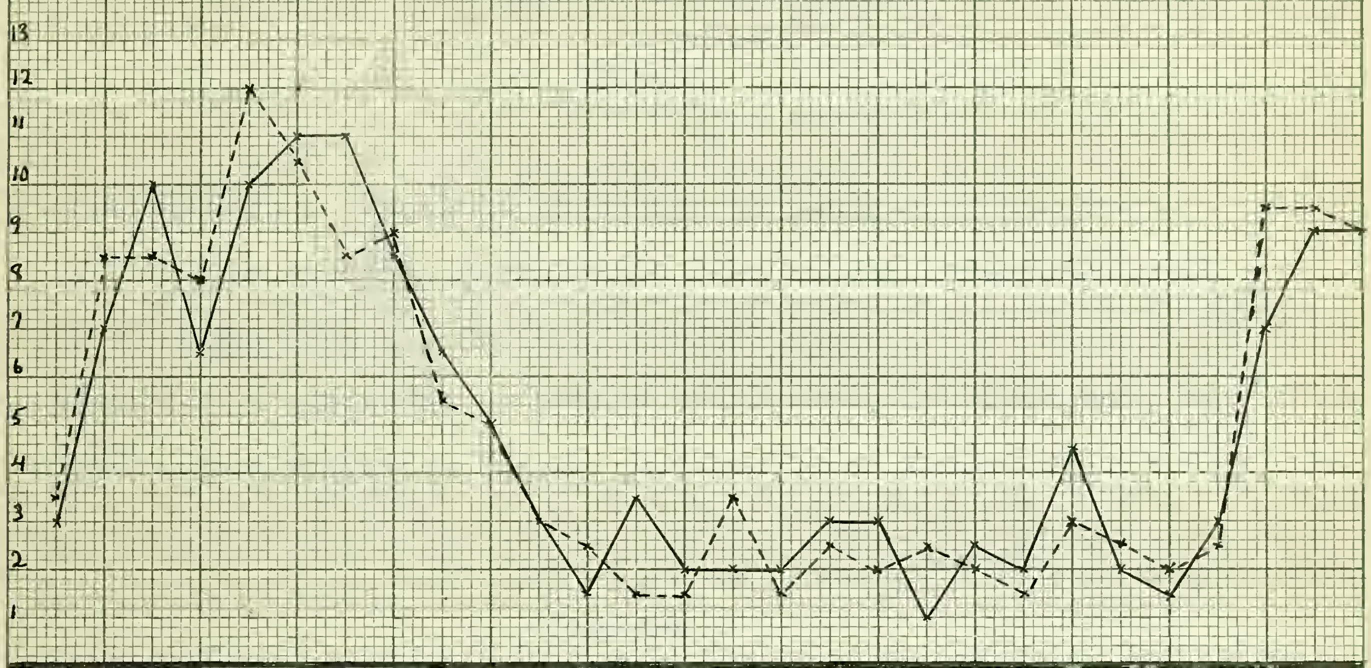
The curves are plotted from the increments given in Table XIII, 1b.



P L A T E X I V.

Mays.

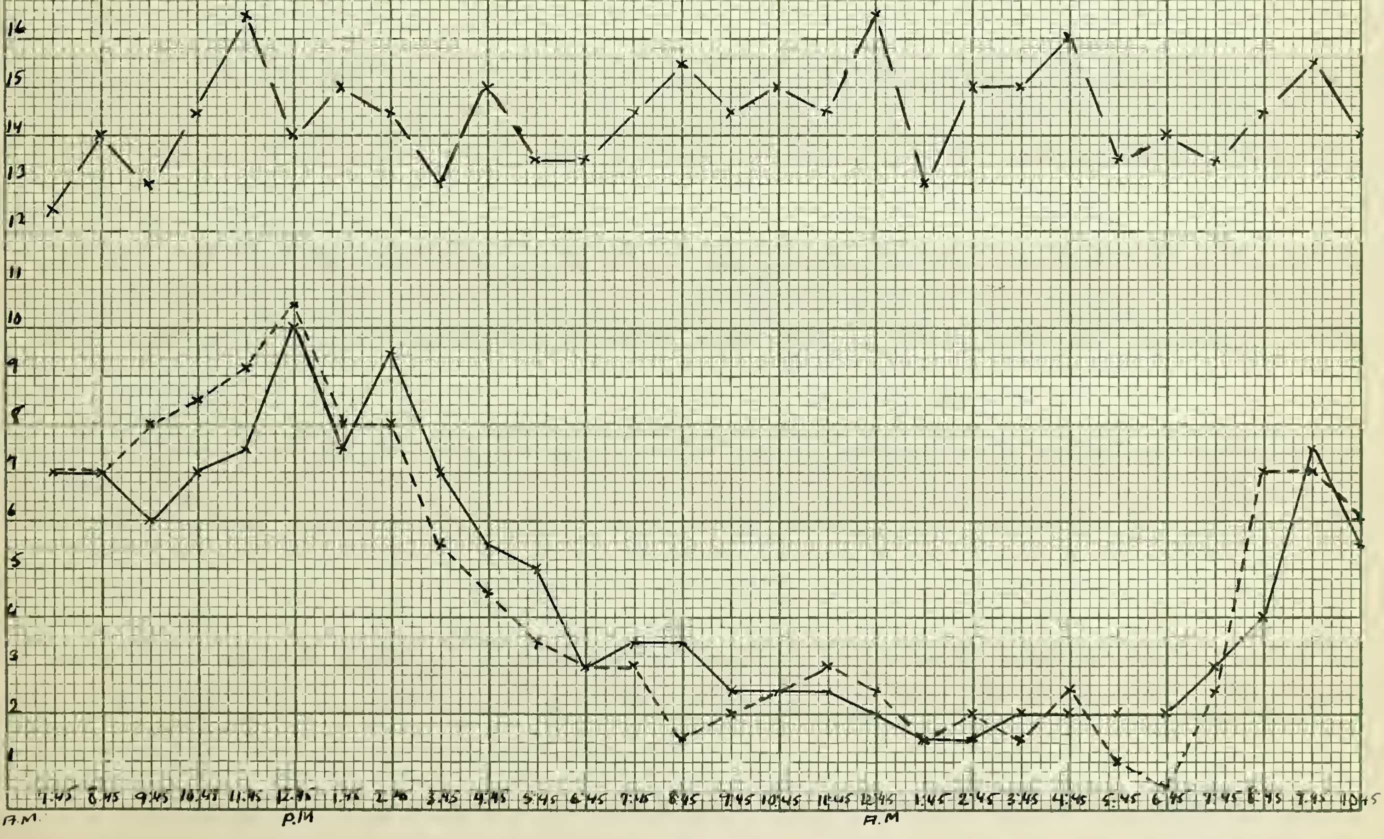
The curves are plotted from the increments given in Table XIV, 2b. The evaporimeter curve is identical with that of Plate XV.



P L A T E X V.

Mays.

The curves are plotted from the increments given in Table XIV,1b.



Ernest M. R. Lamkey

Vita

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