The Effect of Air-Conditioning Upon the Moisture Content of Woods Used for Furniture and Interior Woodwork in Dwelling Houses Palmer, Wm. M.

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THE EFFECT OF AIR-CONDITIONING UPON THE MOISTURE CONTENT OF WOODS USED FOR FURNITURE AND INTERIOR WOODWORK IN DWELLING HOUSES

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The Effect of Air-Conditioning Upon the Moisture Content of Woods Used for Furniture and Interior Woodwork in Dwelling Houses

Introduction

Wood, a hygroscopic material, shrinks and swells with the loss and absorption of moisture. This is especially evident in ordinary dwelling houses when a succession of damp days causes tight drawers, doors, trimming and etc. The differential snugness of wood joints(such as in flooring) from summer when the house is unheated to winter when the house is heated and the atmosphere is very dry, resulting in a reduction of moisture content in wood in the house and a consequent shrinking and loosening of joints is one of the common evidences of this fact.

Will the air-conditioning of buildings have any effect upon the moisture content and the consequent "working" of wood used for furniture and interior woodwork in buildings and if so to what extent ? This is a question that is continually being confronted by home owners, contractors, lumbermen and all persons concerned with construction.

The fact that dimensions of wood are altered with fluctuation of moisture content below the fiber saturation point* is one of the main sources of trouble in the use of wood for furniture, and interior purposes or for any wood construction for that matter. This characteristic of wood has necessitated the formulation and adoption of certain standards of drying and conditioning of wood to be used for definite purposes. These standards or optimum moisture contents are the result of experience and experimentation in an endeavor to have the wood to be used properly conditioned at the time of construction so that the fluctuation of moisture content will not be of any considerable extent, thus reducing the possible annoyance and damage from the swelling and shrinking of wood. The moisture content of wood now considered to be correct for use in furniture and interior use is approximately 6 per cent.

It seems probable that the use of humidification units in dwelling house would tend to alter this moisture content standard since the relative humidity of the air is increased by the use of such units i.e. increase the moisture of wood in buildings. No definite figures are available from which to draw any definite generaligations

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* The fiber saturation point of wood is that point of dryness where the wood cells are devoid of moisture and all the moisture of the wood is in the cell walls. This point is approximately 28% (oven dry weight) for most woods.

or conclusions upon which to base any future practice. However, the fact that the misuse of air-conditioning units caused a loss or damage of $25,000 in the city of Detroit alone and over a million dollars in various cities throughout the East during the winter of 1935-36 illustrates that there is a lack of knowledge somewhere. It is probable that the proper use of the air-conditioning units would not have resulted in such damages, but the probable effect of correct usage is not definitely known. The above mentioned catastrophe has resulted in leeriness on the part of lumber dealers and particularly in over-cautiousness on the part of the manufacturers of air-conditioning units. In fact several such companies have often required house owners to sign papers releasing the manufacturers from liability of damages that might occur if the relative humidity were maintained over 25 per cent. This is in direct contrast to the purpose of the installation of such units since the natural relative humidity without humidification is approximately 25 per cent or slightly above.

If humidification causes such damages the correct step seems to be use of wood that has been conditioned to the moisture content that corresponds to the relative humidity affected by the humidification unit. This would tend to stabilize the moisture content of wood from winter to summer and reduce the probability of damage

This experiment was conducted with the purpose of ascertaining the effect of such air-conditioning upon the wood used for interior purposes in dwelling houses

Object

The object of this experiment was to determine the influence that the the use of air-conditioning units in dwelling house has upon the moisture content (fluctuation and possible approach to a final equilibrium moisture content) of wood used for interior purposes--furniture and interior woodwork.

Procedure--General

Briefly, the general procedure consisted of taking weekly weighings of wood samples of four different species which had been distributed in each of four air-conditioned houses. In addition, the weekly temperature and relative humidities of the houses were secured by averaging the temperature and relative humidity of all the rooms of each house in which the wood samples were located as determined by the use of a sling psychrometer.

The samples selected were devoid of defect, indentified, numbered, finished to correspond to furniture and interior wood (planed, varnished and etc.) and placed throughout the living portion of the house so that they would be exposed to the average conditions of the house but at the same time considering the convenience of the house owners.

At the end of the weighing period the moisture contents of the individual test pieces were determined for each week. This data was then classfied and charted to determine

the moisture content fluctuation by species and for all test samples regardless of species for each house separately and for all houses combined over the period of the experiment.

Procedure -- detailed

Selection of the houses:

The houses were secured by Professor W.L. Kynock. Six houses were secured at first but only four were used. One of the other two was not used because of inability to get in touch with the owners after numerous but fuitle attempts; the other was not used because the installation of a new air-conditioning unit with a recording hydro-thermograph was not completed until it was too late to secure adequate results.

The houses selected were all relatively new brick houses of modern construction with one exception -- the Trosper house, which was not new but a rather substantial frame house.

All the houses used in this experiment were air-conditioned. Tests were not made in houses devoid of air-conditioning units because it was considered that the moisture content trends of wood and the average temperature and relative humidities of such houses were generally known. (The average moisture content of wood is such houses is about 6 per cent and the relative humidity is

about 25 per cent or slightly above and often falling considerably below this, particularly in the winter time).

Species Used:

The species used in this experiment were

White Oak ---- *Quercus alba*

Black Walnut - *Juglans nigra*

Hard Maple --- *Acer saccharum*

Sucupira ----- *Bowdichia brasiliensis*

Only four species were used because of insufficient time for the use of more, the small number of houses and inconvenience that would have been incurred by the house owner had more been used. With the exception of Sucupira, a South American wood, the species tested represent the species most commonly used in furniture and interior work. Sucupira apparently has possibility of being used in the future and so was included in this experiment.

Only hardwoods were used instead of both hardwoods and softwoods because it was thought that the shrinking and swelling of coniferous wood was of limited extent in comparison to hardwoods, which are the chief sources of difficulty..

Test Samples:

Authencity, numbering and size of the samples. The species of each sample was determined by the use of a hand lens. There were four samples of each species or a total of 16

test pieces for each house. The samples were numbered consecutively and irrespective of the houses thus: M 01, for maple and sample number one, therby indicating both the sample number and the species of the sample.

The oak and maple samples were approximately 1" x 3" x 15", the walnut $\frac{5}{4}$" x 1" x 15" and the sucupira 2" x 2" x 10". This size if fairly representative of the dimensions of the material used in interior work. Larger pieces were not used because of the evident inconvevience that larger sizes would have meant to the house owner.

Finishing the Sample. The samples were finished with the purpose of simulating the treatment that ordinary interior woodwork receives.

All the samples were planed on all four sides and the oak, walnut and sucupira samples were filled with Berry Brother's Paste Wood Filler, sanded and dried for a few days. The purpose of this was to fill up the open pores or grain of the wood -- and since maple is close grained this was not done to the maple samples. Following this the oak and maple samples were then coated with one coat of Berry Brother's white shellac while the walnut and sucupira were coated with Berry Brother's orange shellac -- only a difference in coloring.

After the shellac had dried, one coat of Berry Brother's spar varnish was applied to each test piece. After drying, the samples were then rubbed with oil and

pumice to reduce the shining effects of the shellac.

The ends of each test piece were coated with "end-tite", a heavy paint product of Moore Dry Kiln Co., to prevent excessive loss of moisture from the ends of the samples and thus make them correspond as much as possible to larger pieces that might be used in wood structures. Hooks were screwed in the ends of the test pieces to enable hanging them to a support.

Location of the samples in the house:

The samples were placed throughout the living portion of the houses in such places where they were exposed to the average humidity conditions of the house with due consideration for the convenience of the house owners. Some samples were placed on the floor, some in tables, some in bookcases and etc. The exact location of each sample in each house is given tables I a,b,c,and d. of the appendix. Plate number I presents photographs showing the location of a few of the samples. (The samples were naturally placed so that a photograph could be made and therefore are not in their exact position.)

In all houses the samples were placed both up and down stairs -- but not necessarily evenly divided because of various inhibitory conditions.

The distribution in the Patten and Trosper houses was better than in the remaining two houses.

Weighing the Samples and the Determination of Temperature and Relative Humidity:

The weight of each samples was taken weekly to an accuracy of 0.5 gram on a large balance scale furnished by the University of Michigan. The intervals of weighings were not consistent at first but this is not a matter of too great importance since the intervals were not too long to obviate the trend of fluctuation. Weights were taken in the Trosper house at intervals of two weeks.

The accuracy of the balance scales was checked originally and periodically throughout the experiment by means of known weights.

The temperature and relative humidity of each room where the samples were located were determined by means of a sling psychrometer furnished also by the University. These determinations were not begun until the 7th week.

Weighings and relative humidity determinations were discontinued May 12, 1938, the weighings have been begun about November 25, 1937.

Determination of Moisture Content:

After the last weight of the samples had been taken the oven dry weight of each test sample was determined by the following method:

Two small cros section pieces about $\frac{3}{4}$" wide were cut from each test sample, each about 1/3 the distance from the nearest end. These sections were weighed together as

one to an accuracy of .01 of a gram immediately after being cut so that the results obtained would not be affected by any loss of water from the test sections between cutting and weighing. These sections were then dried for one week to a constant weight (oven dry weight).

The moisture content of these sections were then calculated by the formula--

$$\text{Moisture content} = \frac{\text{First or Gross Wt. - O.D. Wt.}}{\text{Oven dry (O.D.) Wt.}} \times 100$$

The moisture content thus determined for each section was considered to be the moisture content of the test sample from which it was cut and corresponding to the last weight taken for this test sample.

Using this moisture content thus secured the oven dry weight of each test sample used in the experiment was calculated by the formula--

$$\text{Oven Dry Wt.} = \frac{\text{Gross or Green Wt. X 100}}{\text{Moisture Content + 100}}$$

Having thus determined the oven dry weight for each test sample (tabulated in table III of the appendix) their moisture contents for each weight taken during the experiment was calculated by the first formula mentioned. The gross or first weight used in each case was the weight of the sample taken each week minus the weight of the end-tite

and hook which had been determined while the sections from each test sample were being oven dried. The weights of the hooks and end-tite are tabulated on Table II of the appendix.

Air-Conditioning Units and the Method of Operation

Table Ø of the appendix shows the name of the air-conditioning or humidifying unit used in the houses. The Tracy and Trosper houses secured humidification by a water spray attached to the heating unit while the Kern unit was a steam spray and secured humidification by passing the air through a steam filled chamber. The Patten unit was a drip spray used in connection with the heating unit.

The Patten house is equipped with summer blowers for conditioning the house during the summer. The other houses are humidified only when the heating unit is on i.e. during the winter time.

In the Trosper house the conditions were not altered for the day or night. In the other three houses the thermostats were so regulated that the day temperature was set for 70 degrees Fahrenheit and the night temperature for 65 degrees F. The time of change was 11 P.M. and 7 A.M. The humidity was thus lowered by a reduction in temperature rather than an actual reduction of the humidity control.

Concerning the operation of these units it is

of interest to note that the owners of the Patten house had to sign papers releasing the manufacturers from all damages that might occur if the relative humidity were maintained over 25 per cent.

In this connection it should be mentioned that the humidifying unit in the Tracy house was cut off for a few days around December 21 because of the exeessive condensation on the window sash. Reports of such condensation has increased the past few years particularly in the new well insulated houses and particularly those which were humidified.**

** This matter of condensation on window frames and in the walls of homes is an important consideration in the regulation of humidification units because even though a high humidity is desired the regulation of the relative humidity inside a house to prevent condensation is primarily dependent upon the difference between outside and inside atmospheric conditions, (temperature and relative humidity).

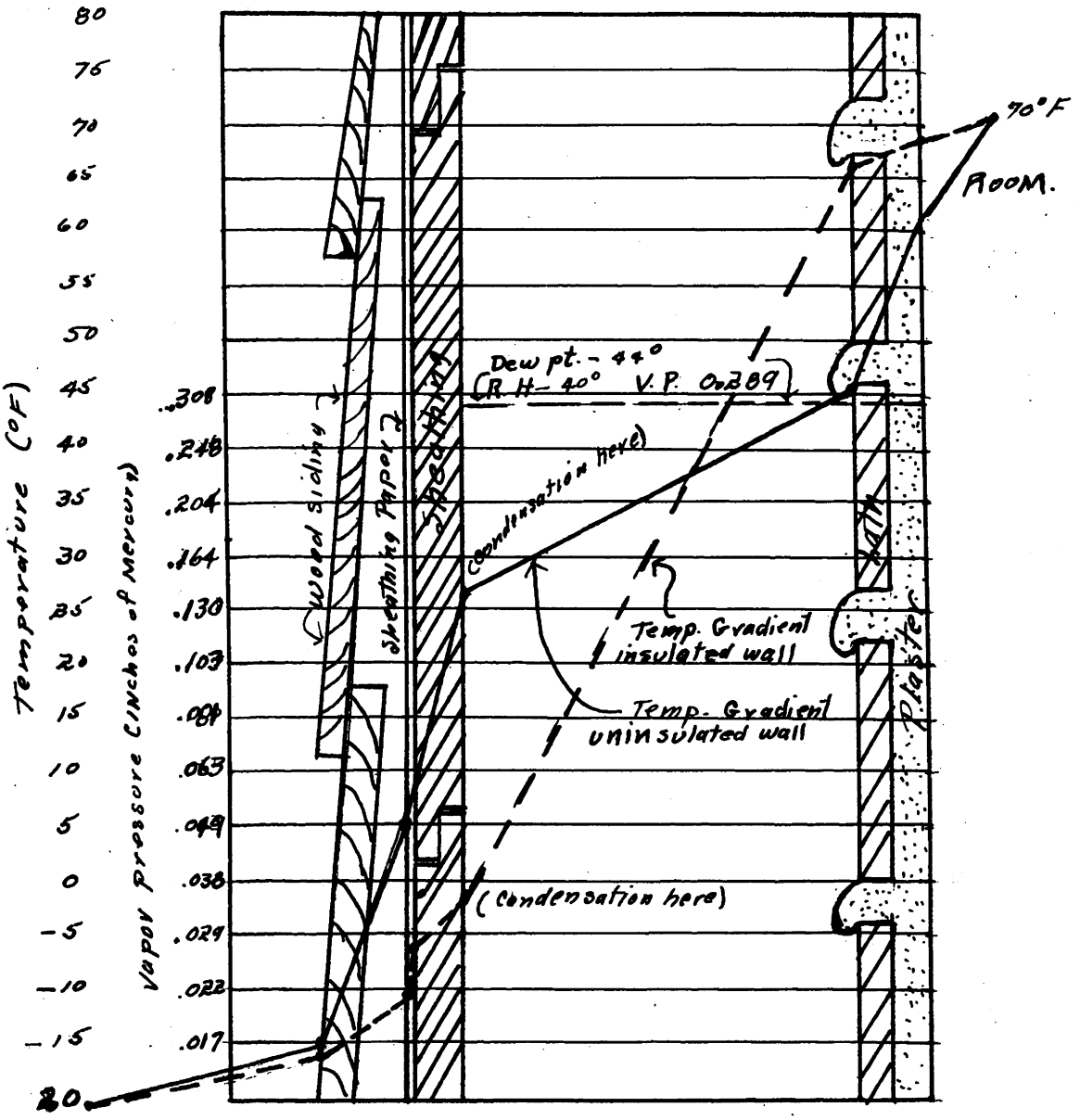
The dew point or point of condensation occurs within the wall causing a condensation of the vapor in the air that has seeped through the wall to the sheathing--thus setting up excellent conditions for decay development as well as altering the moisture content balance of the frame work of the house.

The condensation of moisture in walls may be explained by the use of the diagram on the next page and the following hypothetical atmospheric conditions+

Room temperature ---70 degrees F
Room relative humidity --- 40 per cent
Outside temperature ------ -20 degrees F

From the diagram, if the temperature of the room side of the sheathing is above the dew point temperature of the room then no condendsation can occur. However, as illustrated the trend of the temperature gradient is such that the temperature of the outer part of the wall is considerably lower than the side nearest the room --- the gradient being steeper in the insulated than in the uninsulated wall.

The dew ppint for 40 per cent is 44 degrees and the vapor pressure is 0.289 of an inch. The temperature gradient through the uninsulated wall intersects the



room side of the sheathing at 26 degree above zero, and with saturated air the vapor pressure at this point is 0.137. This difference between 0.289 and 0.137 causes movement of water vapor from the room outward and on being cooled condenses at this point.

The steeper temperature gradient for the insulated wall (because of it effectiveness in holding in the heat) and the resulting lower sheathing temperature causes more condensation under the same set of conditions than in the uninsulated wall since there is a greater difference between the sheathing temperature and the dewpoint temperature. Lower sheathing temperature in insulated walls also cause condensation at lower room humidities than in the case of uninsulated walls.

Since it is not desirable to prevent such condensation by decreasing either the insulation of the wall or the humidity of the house other methods must be adopted. The most effective method experimented with by the Forest Products Laboratory at Madison, Wisconsin is the use of vapor resistant barriers at the inner face of the wall studs. The prerequisite quality of such material for effectiveness is not merely resistance to water absorption but resistance to passage of water vapor from the heated humidified room through the wall, thus preventing the water vapor from reaching the dew point in the wall and condensing there.

Such material that may be used include:

1-Asphalt impregnated and surface coated sheathing paper, glossy surfaced, weighing 50 pounds per roll of 500 square feet

2- Laminated sheathing paper of two or more sheets of kraft paper cemented with asphalt

3- Double-faced reflective insulation mounted on paper***

*** For a more complete and detailed explanation refer to December, 1937, issue of American Builder and Building Age containing the article "Condensation in Walls and Attics", by L.V. Teesdale, from which the above was directly taken

Results and Discussion

A-- Tables IVa through VIId inclusive, of the appendix present the weekly weight of each sample of each species and the corresponding moisture content for each separate house. The accompanying graphs, numbers 1 through 4, present graphically the average weekly fluctuations of each species for each house and also the weekly average moisture content of all the wood samples in the house for a more complete basis of comparison.

The graphs for the separate house bring out the following relations:

The Patten house;

1- Walnut, with an original moisture content of 10.23 per cent shows more drop in moisture content than any other species, but tends to reach stabilization point arount 8.5 percent, with an average over the entire period of 8.72 percent.

2- Oak maintained consistently the highest moisture content of any species, showed little fluctuation and averaged 8.6 per cent for the period.

3- Sucupira was consistently the lowest in moisture content, more or lesss stabilizing about 7 per cent with any average over the period of 7.06 per cent.

4- The maple fluctuated around 8 per cent.

5- The average of all species tended to stabilise around 8 per cent -- being rather high at first

because of the influence of the walnut. The average for the period was 8.09 per cent.

The Tracy house;

1- Walnut again is high at first and then tends to stabilize at a lower point, about 8.25 per cent, with an average of 8.48 per cent for the period.

2- Walnut also consistently maintained the highest moisture content of any species.

3- The sucupira again remained consistently the lowest in moisture content, fluctuating around 7 per cent, with a final average for the period of 6.96 per cent.

4- Maple fluctuated around 7.5 per cent with a final average of 7.42 per cent.

5- The average of all wood in the house shows a moisture content fluctuation around 7.5 per cent with an average of 7.74 for the period.

The Kern house;

1- Walnut again shows a sudden drop from an original moisture content of 10 per cent and also maintained consistently the highest percentage -- fluctuating around 8.25 and averaging for the period at 8.33 per cent.

2- Sucupira still showed the lowest moisture content consistently -- averaging 7.26 per cent for the period.

3- The weekly average of all species tended to stabilize around 8.5 per cent and averaged for the period at 7.70 per cent.

The Trosper house;

1- Here too the moisture content of the walnut drops at first and then seemed to stabilize at a lower moisture content.

2- Walnut and oak show about the same stabilization point with walnut averaging 7.96 per cent and the oak averaging 7.86 per cent for the period.

3- The sucupira here is also consistently the lowest in moisture content -- averaging 6.9 per cent for the period.

4- The average of all species fluctuates around 7.3 per cent and averages for the period at 7.52 per cent.

General;

1- The Trosper and Kern houses show the least fluctuation between species while the Tracy and Patten house seemed to show the greatest fluctuation, however the spread in no house was excessive.

B -- Tables VIIIa-d of the appendix present in tabular form the weekly average moisture fluctuation of each species for each house and the corresponding fluctuation by species for all houses combined.

Graphsnumber 5 accompanying these tables presents the weekly average fluctuation by species for all house combined as compared to the average fluctuation of all wood samples in all the houses (secured from table IX).

The graph (number 5) shows the following facts:

1- A sudden drop in the moisture content of the walnut when averaged for all houses and tending to stabilize about 8.12 per cent, averaging 8.37 per cent for the period and also maintaining the highest consistent moisture content fluctuation -- being slightly higher than the oak.

2- Sucupira still maintains the lowest moisture content when averaged for all houses -- tending to stabilize around 7 per cent with little fluctuation.

3- The oak fluctuates around 8 per cent, averaging 8.09 per cent for the period.

4- The average of all species for all houses fluctuated around 7.6 per cent and averages at 7.76 for the period with no wide deviations from the average.

C-- Table IX of the appendix presents the average weekly moisture fluctuation of all wood samples in each house as compared to the weekly fluctuations of all wood samples averaged for all the houses. Graph number 6 presenting this material graphically shows the following:

1- The average moisture content of all the wood in the Patten house remained consistently higher than the samples in the other 3 houses -- fluctuating around 8 per cent with little variation and averaging 8.09 for the entire period.

2- The moisture content fluctuations in the Kern and Tracy house were about the same, both fluctuating about 7.7 per cent. However, the average over the period

shows the Tracy house to be slightly higher than the Kern house, being 7.74 as compared to 7.70 per cent.

3- The Trosper house shows the lowest moisture content in the wood samples, fluctuating about 7.4 and averaging 7.52 per cent over the period.

4- The average moisture content for all the houses combined tended to stabilize about 7.6 and averaged for the period at 7.76 per cent.

D-- Chart number XIV in the appendix tabulates the weekly and final average temperature and relative humidity for each house and for all houses combined. The mean for each house was considered to be the average of all the rooms of that respective house that had been tested throughout the experiment, (tabulated in Tables X, XI, XII, XIII)

The graph, number 7, accompanying chart number XIV presents this information graphically. Examination of the graph shows immediately that the temperature variation for each house or between houses over the period was not very wide, but that the relative humidities fluctuated very widely.

Considering the final average temperature and relative humidity over the entire period for each house the equilibrium moisture content relations for each house is represented and compared to the actual final average moisture content of the wood samples in the houses as

follows: (in order of the highest equilibrium moisture content relationship)

House	Temperature	R.Humidity	E.M.C.	Actual M.C.
Patten	71.9 F	44.2 %	8.5 %	8.09 %
Tracy	72.9 F	43.0 %	8.3 %	7.74 %
Kern	74.9 F	41.8 %	8.1 %	7.70 %
Trosper	72.1 F	37.2 %	7.4 %	7.52 %
Average	72.9 F	41.6 %	8.1 %	7.76 %

Chart number XV of the appendix presents in tabular form the calculated equilibrium moisture content values for the weekly temperature and relative humidity values for each house and also for all houses combined. The accompanying graphs, numbers 8a-d, present this information graphically, and also compares the weekly average equilibrium values (calculated) to the actual average weekly moisture content of the wood in each house.

Comparing the final value or average in each case the results are essentially the same as mentioned above. (1)

It is noticeable that the average moisture content of the wood samples as mentioned in the preceding section classified the houses in the same order as the calculated equilibrium moisture relationships (temperature and relative humidity)

The moisture content of the wood lagged behind the equilibrium moisture content values which is to be expected

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(1)- The difference in values obtained for the average of all the houses was 0.2% which is due to the necessity of estimating the equilibrium moisture content values from a graphical chart.

particularly since the samples were shellaced and varnished. The important fact is that the actual moisture content of the wood in the various houses followed the trends of the temperature and relative humidity or equilibrium moisture content relationships for each house. (2)

The average moisture content of the woods for each of the several houses do not show great variation from week to week over the period of weighings, particularly after the test pieces once tended to approach their stabilization points. The average moisture content of all the wood in all the houses for the entire testing period was 7.76 or almost 8 per cent with no striking deviations from the norm except at first during which time test pieces were becoming adjusted to the condition to which they were exposed. This average moisture content mentioned for the houses is about 2 per cent higher than that of an unhumidified house.

Graph number 9 of the appendix shows for each house the difference in the final average moisture content over the entire period between the wood samples located downstairs and those located upstairs and also shows their respective relation to the average moisture

(2) Under such conditions as these, comparisons should be based on the final average since the fluctuations of relative humidity are so varied and since the wood lags behind the faster fluctuating relative humidity.

content for the whole house.

There is no appreciable difference in the moisture content of the wood located on the second floor and that located on the first. In this case the wood of two houses showed the moisture content to be slightly greater upstairs while the other two showed the moisture content to be slightly higher downstairs indicating no great difference or consistency.

Summary of Results

The results secured in this experiment may be summarized as follows:

1- The walnut in all houses dropped at first since its original moisture content was high, but it tended to stablize at a relatively high moisture content in all cases as compared to the other species. Its higher moisture content was probable due to its original high value and also because of the lightness of the wood itself.

2- The oak showed a rather high stabilization point also--- averaging 8.09 per cent for all houses.

3- The sucupira was consistently low in moisture content for all the houses without exception, averaging for the period at 7.05 per cent for all houses combined. This low value in comparison to the other species is probably due to the density of the wood itself as well as the initial low moisture content.

4- The average moisture content of all the wood

over the period in the various houses rank the houses in the following order, fron the one in which the moisture content of the wood was the highest to the one in which the moisture content values were the lowest:

1- Patten

2- Tracy

3- Kern

4- Trosper

Tracy and Kern showed little difference in their range of fluctuation but the Tracy house averaged a little higher for the entire period.

5- The temperature and relative humidity relationships or equilibrium moisture content values as determined also classfied the houses in this order indicating a definite trend of the moisture content of the wood to follow or equalize itself with the relative humidity and temperature relationships even though the actual moisture content of the wood lagged behind the quicker reacting temperature and relative humidity.

6- The average fluctuation of all the wood in all houses was not featured by any radical variation but tended to stabilize slightly under 8 per cent -- averaging 7.76 per cent for the period. This is about 2 per cent higher than the average for unhumidified houses.

7- The variation in moisture content for the different species or for all the wood regardless of species in the houses themselves was not very great--being within 2

per cent when individual variations are concerned but being within 0.5 per cent when the average is considered.

8- The variation between moisture content of the samples located up and downstairs was of little consequence and showed no consistency.

9- The average relative humidity though higher than that of unhumidified houses is still below that which is recommended by doctors as being proper conditions for health -- temperature of 68 to 71 degrees Fahrenheit and a relative humidity of 55 or 56 per cent.

Should the humidity be raised from the present average of 41.6 per cent to 55 per cent the effect on the moisture content of the wood would no doubt be more apparent.

Conclusions

There seems to be no doubt that the moisture content fluctuation of wood in houses is dependent upon the temperature and relative humidity that is maintained. This is clearly shown in the discussion of the results correlating the calculated equilibrium moisture content of the different houses with the actual moisture content of the wood samples located in the houses. The moisture content of the wood did not fall during the entire period below 6.5 per cent and the final average and fluctuation range show approximately values 1.5 to 2 per cent higher than this.

It is difficult to make any outright statements or

draw any hard and fast conclusions as to the exact extent of the effect that air humidification has upon wood in homes without the substantiation of more data. However, based upon the results of this experiment and and considering the equilibrium moisture content relationships that were maintained during this experiment it is safe to say that the moisture content of interior woodwork is raised at least 1 to 3 per cent over that of unhumidified homes.

The extent of the effect of such humidification upon the moisture content of the wood depends upon the methods used by the home owners in regulating the unit itself i.e. the temperature and relative humidity for which the plant is set and the consistency with which these conditions are maintained. The more consistent these relationships are maintained the less the fluctuation of the moisture content of the wood.

This experiment indicates that if the humidity of homes is maintained at 50 per cent plus as recommended by medical authorities as being proper conditions for health and comfort that the resulting equilibrium moisture content relationship will no doubt result in effecting a rise in the moisture content of wood used in the humidified house to approximately 10 per cent with little fluctuation.

Recommendations for Future Study

In view of the fact that more study of this subject is probable and surely advisable the following recommendations or suggestions are offered in the light of the experience incurred through the conduction of this experiment:

1- The experiment should be run throughout the year if possible, to determine the fluctuation throughout the year and thus form a more complete picture of the moisture content variation from winter to summer.

2- Tests should be made in unhumidified houses even though the general trend of moisture content in such buildings is already known. This would enable a more concrete basis of comparison.

3- More houses should be tested if possible, however, the gradual building up of data over a period of time may suffice.

4- Circulation of the air in the houses should be tested in a general way if not in detail.

5- The size of the wood samples should preferably be all of the same size.

6- Some of the wood samples should receive no treatment at all. This would result in quicker reactions but at the same time not be incomparable to wood use in furniture since some of the wood thus used may be unpainted.

7- The effectiveness of moisture vapor resistant material in preventing condensation should be studied as much as is practicable.

Should work on this experiment be continued the fact should not be over-looked that Dean Anderson of the Engineering School has offered the use of his home which has a newly installed air-conditioning unit equipped with an automatic hydro-thermograph. This is one of the houses that was intended to be used in this experiment.

APPENDIX

Table 0

The Air-Conditioning Unit Used in each House

The Patten house:

Delco Heat and Air-Conditioning Unit

Delco Remy Corp.

Drip spray

The Tracy house:

Automatic Heat and Air-Conditioning Unit

Scott-Newcomb Inc.

St. Louis, Mo.

The humidification is secured by a water spray

The Kern house;

Sheer-Comfort Heat controlled Humidifier

H. M. Sheer Company

Quincy, Illinois

The humidification is secured by a steam spray

The Trosper house:

Torrid Zone Aire-Flo Air-Conditioning Unit

Lennox Furnace Company

Syracuse, N.Y. and Marshalltown, Iowa

The humidification is secured by a water spray

Table Ia

Position of Test Pieces in Dr. Patten's Home

Downstairs:

Living Room-

M 20	bookshelf about 3 feet high
M 18	bookshelf about 3 feet high
O 47	bookshelf about 3 feet high on other side of room
W 93	floor
S 70	floor

Dining Room-

W 94	in dining room table
O 45	in dining room table
W 92	floor
M 22	floor

Study-

W 95	in telephone shelf about 3 feet high
S 72	in wall cavity above bookshelf about 6 feet high

Upstairs:

Bedroom-

S 67	floor
S 69	floor
O 43	wall board about 4 feet high

Sewing room-

O 48	floor

Basement-

M 19	on table about 1 foot above floor

Table I

Position of Test Pieces in Professor Tracy's Home

Downstairs:

Living Room-

S 52	floor
W 24	floor
W 75	corner of room on floor
S 50	corner of room on floor near regulator
M 15	behind couch, slightly off floor
S 63	in wall cavity above a book case
M 01	in wall cavity above a book case

Dining Room-

W 73	floor behind door
0334	floor behind door
M 13	window sill

Kitchen--(really the breakfast room)

0 35	sideboard against the wall
0333	slightly off the floor under sink

Upstairs:

Hall-

W 78	slightly off the floor against the wall

Study-

S 56	on springs of a couch
M 07	on books in a bookshelf, 5 feet high
0 31	in a wall cavity, 7 feet high

Table Ic

Position of Test Pieces in Mrs Kern's Home

Downstairs:

Living Room-

O 46	floor
O 36	in piano
S 68	floor near piano
W 88	slightly off floor in corner of room

Study-

W 96	floor behind the door
S S 64	top of bookcase
M 23	shelf of bookcase about 2⅓ feet high
S 71	behind divan slightly off the floor
M 24	behind divan slightly off the floor
M 21	top of book case

Dining room*

O 44	floor
W 84	slightly off floor

Upstairs:

Hall-

O 38	floor
S 66	slightly off floor against the wall

Sewing Room-

M 17	one half foot off floor against the wall
W 80	one foot off floor against the wall

Table Id

Position of Test Pieces in Mrs. Trosper's Home

Downstairs:

Living Room-

M 6 on mantle against the wall

M 10 on mantle against the wall

S 57 in bookshelf about 3 feet high

W 85 top of bookshelf about 5 feet high

M 09 in a piano

Dining Room-

M 08 in the dining room table

W 83 in the dining room table

S 58 floor in corner of room

Upstairs:

Hallstairs-

S 59 staircase

Girls bedroom-

O 32 wall board about 6 feet high in corner of room

W 82 wall board about 6 feet high in opposite corner

Bedroom over Living room-

W 86 on mantle against the wall

S 55 top of gun case

O 30 top of gun case

Boys bedroom-

O 37 wall board about 6 feet high in corner of room

O 29 wall board about 6 feet high in opposite corner

Plate I

Illustrations showing the Position of the Samples

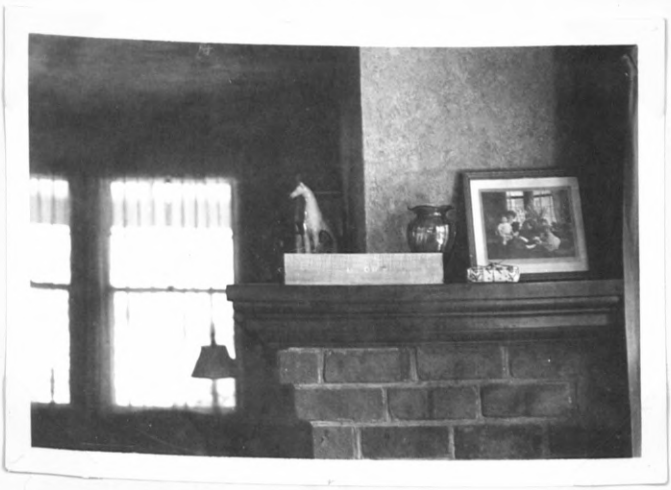


Table II

Weight of Hooks and End-tite Used on the Wood Samples Themselves

Maple	Weight in Grams	Oak	Weight in Grams	Sucupira	Weight in Grams	Walnut	Weight in Grams
1	2.5	29	2.5	50	3.5	73	2.0
6	2.5	30	3.5	52	4.0	74	2.0
7	2.5	31	3.0	55	4.5	75	2.0
8	3.5	32	3.0	56	3.5	78	2.0
9	3.5	33	2.5	57	4.0	80	2.0
10	3.5	34	3.0	58	3.5	82	2.0
13	2.0	35	3.5	59	4.5	83	2.0
15	3.0	36	3.0	63	3.5	84	2.0
17	2.5	37	3.5	64	3.5	85	2.0
18	2.5	38	3.5	66	4.0	86	2.0
19	4.5	43	3.0	67	4.0	88	2.0
20	3.0	44	3.5	68	4.0	92	2.0
21	3.5	45	4.0	69	4.5	93	2.0
22	2.0	46	2.5	70	3.0	94	2.0
23	2.0	47	3.0	71	4.5	95	2.0
24	3.0	48	3.5	72	4.0	96	2.0

Table III

Oven-dry Weight of Samples by Species

Maple	Weight in Grams	Oak	Weight in Grams	Sucupira	Weight in Grams	Walnut	Weight in Grams
1	457.5	29	436.5	50	548.2	73	317.9
6	475.3	30	413.3	52	545.0	74	288.1
7	459.5	31	428.2	55	531.6	75	308.2
8	416.0	32	416.1	56	508.7	78	274.7
9	469.5	33	407.9	57	482.9	80	327.3
10	455.6	34	408.2	58	533.6	82	289.9
13	464.0	35	417.4	59	501.9	83	335.1
15	462.7	36	439.9	63	471.7	84	302.7
17	469.6	37	416.2	64	512.0	85	319.4
18	463.8	38	440.4	66	588.5	86	299.8
19	465.8	43	425.4	67	494.7	88	310.4
20	467.2	44	429.6	68	445.9	92	306.2
21	460.7	45	416.6	69	494.3	93	311.7
22	456.1	46	416.2	70	558.0	94	326.4
23	452.4	47	429.6	71	544.4	95	309.2
24	432.6	48	433.9	72	468.1	96	317.4

Table IVa

Weight in Grams of the Samples of Walnut and Their Moisture Content for Dr. Patten's House

Wk.	W-92	M.C.	W-93	M.C.	W-94	M.C.	W-95	M.C.	Av. M.C.
0	338.5	10.55	344.5	10.52	456.0	9.07	342.5	10.77	10.23
1	337.5	10.22	345.0	10.68	357.0	9.38	344.0	11.25	10.38
3	335.0	9.41			353.5	8.30	342.0	10.61	9.44
4	336.0	9.73	342.0	9.72	354.0	8.46	342.0	10.61	9.63
5	333.5	8.92	340.0	9.08	353.0	8.15	341.0	10.28	9.11
7	334.5	9.24	340.0	9.08	353.0	8.15	340.0	9.96	9.11
8	332.0	8.43	338.0	8.44	351.0	7.54	338.5	9.48	8.72
9	332.5	8.59	338.0	8.44	351.0	7.54	339.5	9.80	8.84
10	330.5	7.94	337.5	8.28	351.0	7.54	339.0	9.64	8.59
11	331.0	8.10	336.0	7.80	350.0	7.23	338.5	9.48	8.15
12	330.5	7.94	337.5	8.28	349.5	7.08	337.0	8.99	7.82
13	330.5	7.94	336.5	7.96	350.0	7.23	339.0	9.64	8.19
14	331.5	8.26	336.5	7.96	350.0	7.23	339.0	9.64	8.27
15	331.5	8.26	336.5	7.96	351.0	7.50	338.5	9.48	8.30
16	331.5	8.26	337.0	8.12	351.5	7.69	338.5	9.48	8.39
17	332.0	8.43	336.5	7.96	351.5	7.69	338.0	9.31	8.35
18	331.0	8.10	335.0	7.48	349.5	7.08	336.5	8.67	7.83
19	331.5	8.26	336.5	7.96	352.5	8.00	339.0	9.64	8.47
20	332.0	8.43	337.5	8.12	351.5	7.69	339.0	9.64	8.47
21	332.5	8.59	337.0	8.12	352.0	7.84	339.5	9.80	8.59
22	332.0	8.43	336.5	7.96	352.0	7.84	336.0	8.67	8.23
Av.		8.67		8.50		7.82		9.75	8.72

Table IV b

Weight in Grams of the Samples of Sucupira and Their Moisture Content for Dr. Patten's House

Wk.	S-67	M.C.	S-69	M.C.	S-70	M.C.	S-72	M.C.	Av. M.C.
0	532.5	7.64	533.5	7.93	599.5	7.44	503.0	7.46	7.62
1	532.5	7.64	534.5	8.13	600.0	7.53	503.0	7.46	7.69
3	530.5	7.24	533.0	7.83	599.0	7.44	503.0	7.46	7.49
4	530.5	7.24	532.5	7.73	599.0	7.35	502.0	7.24	7.39
5	529.5	7.03	531.5	7.53	597.0	6.99	501.0	7.03	7.15
7	529.5	7.03	530.5	7.32	598.0	7.17	501.0	7.03	7.14
8	529.0	6.93	530.5	7.32	596.0	6.81	499.0	6.60	6.92
9	529.0	6.93	531.0	7.42	596.5	6.90	498.5	6.49	6.94
10	529.0	6.93	529.5	7.12	596.5	6.90	499.0	6.60	6.89
11	528.5	6.83	529.5	7.12	595.5	6.72	498.5	6.49	6.79
12	527.5	6.63	529.5	7.12	596.0	6.81	499.5	6.71	6.82
13	529.0	6.93	530.5	7.32	595.5	6.72	499.5	6.71	6.92
14	529.5	7.03	530.5	7.32	596.0	6.81	499.5	6.71	6.97
15	529.5	7.03	531.0	7.42	596.5	6.90	498.5	6.49	6.96
16	529.0	6.93	530.5	7.32	597.0	6.99	498.5	6.49	6.93
17	528.5	6.83	530.5	7.32	596.0	6.81	498.5	6.49	6.86
18	527.0	6.53	529.0	7.02	594.5	6.54	598.5	6.49	6.65
19	527.5	6.63	530.5	7.32	597.0	6.99	498.5	6.49	6.86
20	529.5	7.03	531.5	7.53	597.0	6.99	498.5	6.47	7.01
21	530.0	7.14	531.5	7.53	598.0	7.17	499.5	6.71	7.14
22	530.0	7.14	532.0	7.63	596.0	6.81	499.0	6.60	7.05
Av.		7.01		7.44		6.99		6.77	7.06

Table IVc

Weight in Grams of the Samples of Oak and Their Moisture Content for Dr. Patten's House

Wk.	O-43	M.C.	O-45	M.C.	O-47	M.C.	O-48	M.C.	Av. M.C.
0	463.5	8.96	451.0	6.26	468.0	8.94	471.0	8.55	8.68
1	464.0	9.07	453.0	8.74	469.5	9.29	472.0	8.78	8.97
3	465.0	9.31	451.0	8.26	468.0	8.94	471.5	8.67	8.80
4	465.0	9.31	451.0	8.26			471.5	8.67	8.75
5	464.5	9.19	449.5	7.90	468.5	9.05	471.5	8.67	8.45
7	464.0	9.07	450.0	8.02	469.0	9.17	471.0	8.55	8.70
8	462.5	8.72	450.0	8.02	469.0	9.17	469.5	8.20	8.53
9	462.5	8.72	450.0	8.02	470.5	9.52	470.0	8.32	8.65
10	462.5	8.72	448.0	7.54	469.5	9.29	470.0	8.32	8.47
11	462.0	8.60	447.5	7.42	470.0	9.40	469.0	8.09	8.38
12	462.0	8.60	448.5	7.66	470.0	9.40	468.0	7.86	8.38
13	462.5	8.72	447.5	7.42	470.0	9.40	468.5	7.97	8.38
14	463.0	8.84	448.5	7.66	470.0	9.40	469.5	8.20	8.53
15	463.0	8.84	447.5	7.42	469.5	9.29	470.0	8.32	8.47
16	465.0	9.31	450.0	8.02	469.5	9.29	470.5	8.44	8.77
17	464.0	9.07	448.0	7.54	469.0	9.17	471.0	8.55	8.58
18	462.0	8.60	447.0	7.30	468.0	8.94	468.5	7.97	8.20
19	464.0	9.07	450.0	8.02	469.0	9,17	470.5	8.44	8.68
20	464.0	9.07	450.0	8.02	469.5	9.29	470.5	8.44	8.71
21	464.5	9.19	450.0	8.02	470.0	9.40	471.0	8.55	8.79
22	464.5	9.19	450.0	8.02	469.5	9.29	472.0	8.78	8.82
Av.		8.96		7.88		9.24		8.40	8.60

Table IVd

Weight in Grams of the Samples of Maple and Their Moisture Content in Dr. Patten's House

Wk.	M-18	M.C.	M-19	M.C.	M-20	M.C.	M-22	M. C.	Av. M.C.
0	501.0	8.07	506.0	7.66	503.0	7.66	492.0	7.87	8.05
1	501.5	8.13	504.5	8.31	504.0	7.88	492.0	7.87	8.05
3	502.5	8.34	505.5	8.52	505.0	8.09	492.5	7.98	8.23
4	501.5	8.13	505.5	8.52	505.0	8.09	492.0	7.87	8.15
5	501.0	8.02	504.5	8.31	503.5	7.77	489.5	7.32	7.86
7	500.5	7.91	504.5	8.31	503.0	7.66	489.0	7.21	7.77
8	500.0	7.81	503.5	8.09	502.5	7.56	488.5	7.10	7.64
9	500.0	7.81	505.0	8.42	503.0	7.66	488.5	7.10	7.75
10	501.5	8.13	504.5	8.31	503.5	7.77	487.5	6.88	7.77
11	502.5	8.34	504.0	8.20	504.0	7.88	487.5	6.88	7.83
12	501.5	8.13	504.5	8.31	503.5	7.77	488.5	7.10	7.83
13	501.5	8.13	504.5	8.31	503.0	7.66	488.0	6.99	7.77
14	503.0	8.45	505.0	8.42	505.0	8.09	488.5	7.10	8.02
15	502.5	8.34	506.0	8.63	504.5	7.98	488.5	7.10	8.01
16	502.5	8.34	506.0	8.63	504.5	7.98	490.0	7.43	8.10
17	502.5	8.34	507.5	8.78	505.0	8.09	489.5	7.32	8.13
18	501.5	8.13	505.5	8.52	503.5	7.77	488.0	6.99	7.85
19	502.5	8.34	508.0	9.06	505.0	8.09	490.5	7.54	8.26
20	504.0	8.67	508.0	9.06	505.0	8.09	490.0	7.43	8.31
21	504.5	8.78	508.0	9.06	505.0	8.09	491.0	7.65	8.40
22	504.0	8.67	509.0	9.27	505.0	8.09	491.5	7.76	8.45
Av.		8.24		8.56		7.89		7.36	8.01

Graph 1

Average weekly moisture content fluctuation of each species in the Patten house

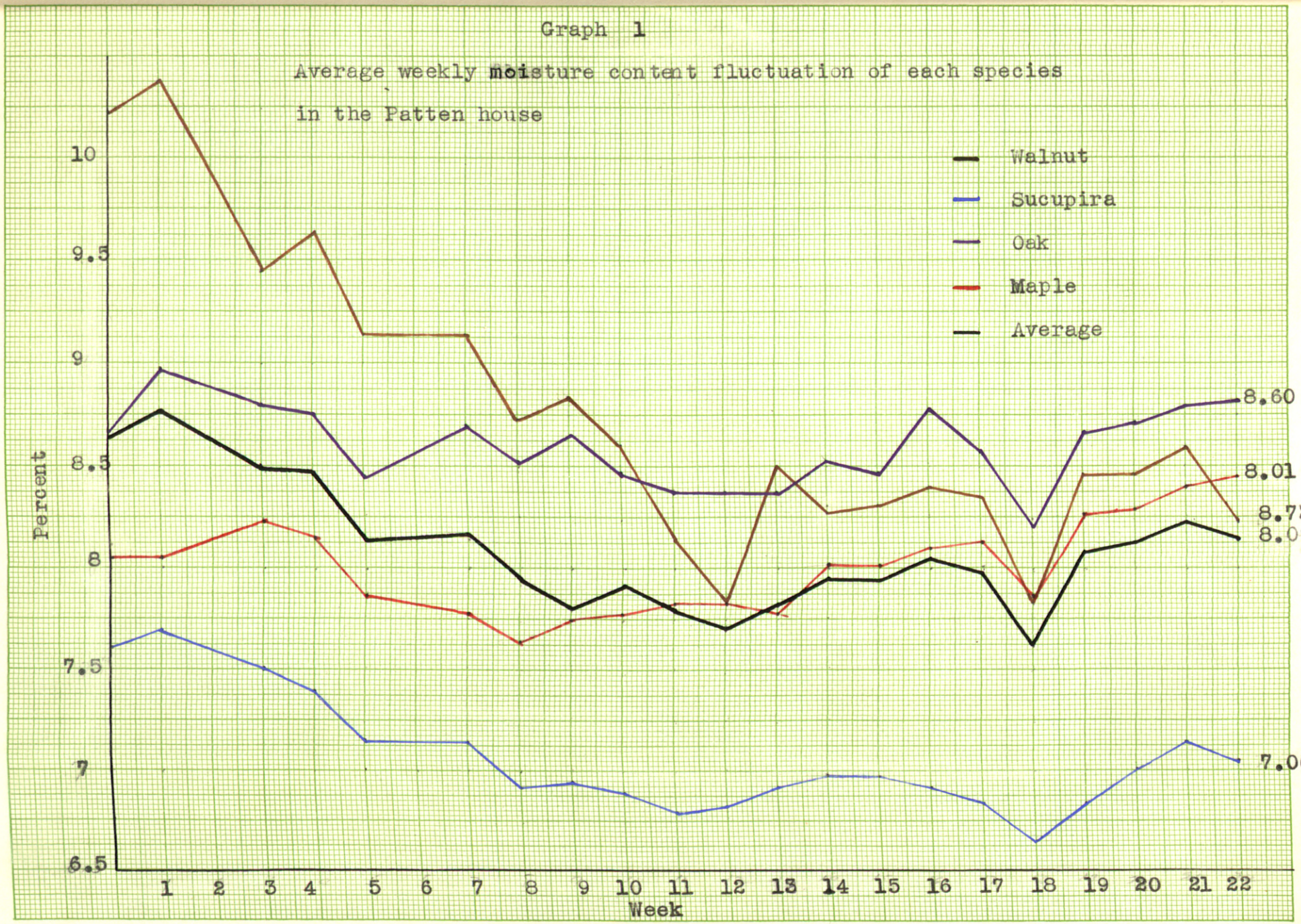


Table Va

Weight in Grams of the Samples of Walnut and Their Moisture Content for Prof. Tracy's House

Wk.	S-73	M.C.	W-74	M.C.	W-75	M.C.	W-78	M.C.	Av. M.C.
0	350.5	10.10	318.5	10.55	337.5	9.51	305.0	11.03	10.30
1	347.0	9.15	316.5	9,86	336.0	9.02	302.5	10.12	9.54
3	344.5	8.37	315.5	9.51	335.0	8.70	301.5	9.76	9.09
4	342.5	7.74	313.0	8.64	333.0	8.05	301.5	9.39	8.46
5	342.5	7.74	314.0	8.99	333.5	8.21	301.0	9.57	8.63
7	342.5	7.74	314.0	8.99	334.0	8.37	301.0	9.57	8.67
8	342.0	7.58	313.0	8.64	333.0	8.05	300.5	9.39	8.41
9	342.0	7.58	314.0	8.99	333.5	8.21	299.5	9.03	8.45
10	340.0	6.95	312.0	8.30	333.0	8.05	298.5	8.66	7.99
11	340.0	6.95	312.0	8.30	332.0	7.72	298.0	8.48	7.86
12	340.0	6.95	312.5	8.47	332.5	7.88	299.5	9.03	8.08
13	340.0	6.95	312.5	8.47	333.0	8.05	299.0	8.84	8.08
14	340.0	6.95	312.5	8.47	332.5	7.88	298.0	8.48	7.95
15	342.0	7.58	314.0	8.99	334.0	8.37	299.0	8.84	8.45
17	340.5	7.11	313.0	8.64	333.0	8.05	298.0	8.48	8.07
18	339.5	6.79	312.5	8.47	333.0	8.05	298.5	8.66	7.99
19	341.5	7.42	313.0	8.64	333.5	8.21	299.5	9.03	8.33
20	341.5	7.42	313.0	8.64	334.0	8.37	299.0	8.84	8.32
21	342.0	7.58	313.0	8.64	334.0	8.37	299.0	8.84	8.36
22	342.5	7.74	314.0	8.99	335.0	8.70	300.0	9.21	8.66
Av.		7.62		8.86		8.27		9.17	8.48

Table Vb

Weight in Grams of the Samples of Sucupira and Their Moisture Content for Professor Tracy's House

Wk.	S-50	M.C.	S-52	M.C.	S-56	M.C.	S-63	M.C.	Av. M.C.
0	595.5	7.53	585.0	7.34	544.5	7.04	507.0	7.48	7.35
1	588.0	7.26	584.5	7.25	545.5	7.23	507.0	7.48	7.31
3	589.5	7.53	583.0	6.97	545.5	7.23	506.0	7.27	7.25
4	586.5	6.99	382.5	6.88	543.5	6.84	505.5	7.17	6.96
5	588.0	7.26	580.5	6.51	544.0	6.94	505.0	7.06	6.94
7	590.0	7.62	581.0	6.61	544.0	6.94	505.0	7.06	7.06
8	588.5	7.35	580.5	6.51	544.5	7.04	505.5	7.17	7.02
9	587.5	7.17	579.0	6.24	543.5	6.84	504.0	6.85	6.78
10	587.5	7.17	579.0	6.24	543.5	6.84	503.5	6.74	6.75
11	587.5	7.17	578.5	6.15	542.5	6.64	503.0	6.64	6.65
12	587.5	7.17	579.0	6.24	544.5	7.04	504.0	6.85	6.83
13	588.5	7.35	579.5	6.33	543.5	6.84	504.5	6.95	6.87
14	588.0	7.26	578.5	6.15	543.5	6.84	503.5	6.74	6.75
15	588.5	7.35	579.0	6.24	544.0	6.94	504.5	6.95	6.87
17	589.0	7.44	579.5	6.33	543.0	6.74	504.5	6.95	6.88
18	588.5	7.35	579.5	6.33	542.5	6.64	503.5	6.74	6.77
19	589.0	7.44	580.0	6.42	544.5	7.04	504.5	6.95	6.97
20	589.0	7.44	580.5	6.51	544.5	7.04	504.5	6.95	6.99
21	589.5	7.53	580.5	6.51	544.5	7.04	504.5	6.95	7.01
28	590.5	7.72	581.0	6.61	545.0	7.14	505.0	7.06	7.13
Av.		7.36		6.52		6.94		7.00	6.96

Table Vc

Weight in Grams of the Samples of Oak and Their Moisture Content for Professor Tracy's House

Wk.	0-31	M.C.	0-33	M.C.	0-34	M.C.	0-35	M.C.	Av. M.C.
0	466.5	8.94	445.5	9.22	445.0	9.02	455.5	9.13	9.08
1	465.0	8.59	443.5	8.73	445.0	9.02	452.0	8.29	8.87
3	464.5	8.48	443.5	8.73	443.0	8.53	452.5	8.41	8.54
4	462.5	8.01	443.5	8.73	441.5	8.16	449.5	7.69	8.15
5	463.5	8.24	443.5	8.73	442.0	8.28	449.0	7.57	8.21
7	465.0	8.59	443.0	8.61	444.0	8.77	447.5	7.21	8.30
8	465.0	8.59	441.5	8.24	443.0	8.53	447.5	7.21	8.14
9	464.0	8.36	442.0	8.36	443.0	8.53	447.5	7.21	8.12
10	463.5	8.24	441.0	8.11	443.5	8.65	445.5	6.73	7.93
11	463.0	8.13	441.0	8.11	443.5	8.65	445.5	6.73	7.91
12	464.0	8.36	441.0	8.11	442.0	8.28	446.0	6.85	7.90
13	464.0	8.36	441.0	8.11	440.5	7.91	446.5	6.97	7.84
14	463.0	8.13	440.0	7.87	440.5	7.91	446.0	6.85	7.69
15	463.5	8.24	440.5	7.99	440.0	7.79	446.5	6.97	7.75
17	462.5	8.01	440.5	7.99	439.0	7.55	447.0	7.09	7.86
18	462.5	8.01	438.5	7.50	438.5	7.42	446.5	6.97	7.48
19	464.5	8.48	441.0	8.11	441.0	8.04	448.5	7.45	8.02
20	464.0	8.36	440.5	7.99	441.0	8.04	448.5	7.45	7.96
21	494.0	8.36	441.0	8.11	441.0	8.04	449.0	7.57	8.02
22	464.5	8.48	441.5	8.24	442.0	8.28	449.5	7.69	8.17
Av.		8.35		8.28		8.27		7.40	8.09

Table Vd

Weight in Grams of the Samples of Maple and Their Moisture Content for Professor Tracy's House

Wk.	M-1	M.C.	M-7	M.C.	M-13	M.C.	M-15	M.C.	Av. M.C.
0	494.0	7.98	495.5	7.83	500.0	7.76	500.0	8.06	7.91
1	492.5	7.65	495.5	7.83	500.0	7.76	499.5	7.95	7.80
3	491.5	7.43	495.5	7.83	502.0	8.19	499.5	7.95	7.85
4	489.0	6.89	494.5	7.62	500.5	7.87	498.0	7.63	7.50
5	489.0	6.89	495.0	7.73	499.5	7.65	497.5	7.52	7.45
7	490.5	7.21	496.5	8.05	498.0	7.33	498.0	7.63	7.56
8	488.5	6.78	495.5	7.83	500.0	7.76	497.5	7.52	7.47
9	488.5	6.78	495.5	7.83	496.0	6.90	497.0	7.41	7.23
10	487.5	6.56	494.0	7.51	495.0	6.68	496.5	7.30	7.01
11	488.0	6.67	493.5	7.40	495.0	6.68	497.0	7.41	7.04
12	488.5	6.78	495.5	7.83	495.0	6.68	496.5	7.30	7.15
13	487.5	6.56	494.5	7.62	495.0	6.68	496.5	7.30	7.04
14	487.5	6.56	494.5	7.62	495.0	6.68	496.5	7.30	7.04
15	489.5	6.99	495.0	7.73	496.0	6.90	498.0	7.63	7.31
17	489.5	6.99	495.0	7.73	496.5	7.00	498.0	7.63	7.34
18	490.0	7.10	494.0	7.51	496.0	6.90	498.0	7.63	7.29
19	491.5	7.43	495.0	7.73	497.0	7.11	499.5	7.95	7.56
20	491.5	7.43	495.5	7.83	496.5	7.00	499.5	7.95	7.55
21	491.5	7.43	495.5	7.83	496.5	7.00	500.0	8.06	7.58
22	492.5	7.63	496.0	7.94	497.5	7.22	501.0	8.28	7.77
Av.		7.09		7.74		7.19		7.67	7.42

Graph 2

Average weekly moisture content fluctuation of each species in the Tracy house

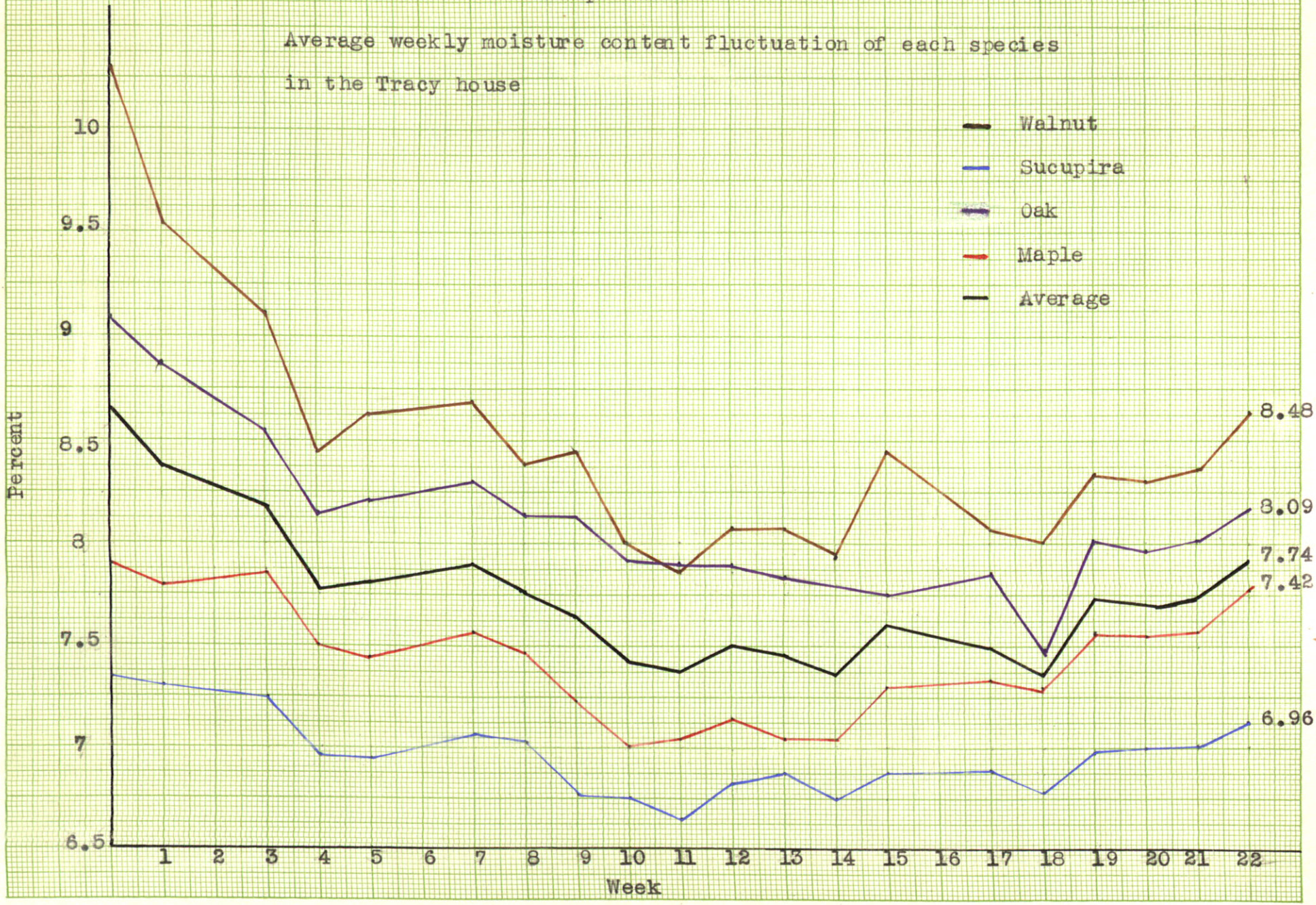


Table VIa

Weight in Grams of the Samples of Walnut and Their Moisture Content for Mrs. Kern's House

Wk.	W-80	M.C.	W-84	M.C.	W-88	M.C.	W-96	M.C.	Av. M.C.
0	359.0	9.69	332.0	9.68	343.0	10.50	349.5	10.11	10.00
1	356.0	8.77	328.5	8.52	341.0	9.86	346.0	8.70	9.04
3	357.0	9.07	329.0	8.69	341.0	9.86	345.0	8.70	9.08
5	356.5	8.92	326.0	7.70	339.5	9.38	343.0	8.07	8.52
7	354.5	8.31	324.0	7.04	339.0	9.21	341.0	7.44	8.00
8	355.0	8.46	327.0	8.03	338.5	9.05	341.0	7.44	8.05
10	355.0	8.46	324.0	7.04	338.0	8.89	341.0	7.44	7.96
11	355.0	8.46	324.0	7.04	338.0	8.89	341.0	7.44	7.96
12	353.5	8.00	325.0	7.37	337.5	8.73	341.5	7.59	7.92
13	355.0	8.46	325.5	7.53	339.0	9.21	341.5	7.59	8.20
14	355.0	8.46	325.5	7.53	339.5	9.38	341.0	7.44	8.20
15	355.5	8.62	325.0	7.37	338.0	8.89	340.5	7.28	8.04
16	355.0	8.46	325.5	7.53	338.5	9.05	340.5	7.28	8.08
17	354.5	8.31	325.0	7.37	337.5	8.73	341.0	7.44	7.96
18	355.0	8.46	326.0	7.70	339.0	9.21	341.0	7.44	8.20
19	355.0	8.46	326.0	7.70	338.5	9.05	341.0	7.44	8.16
20	355.5	8.62	326.0	7.70	338.0	8.89	342.0	7.75	8.24
21	355.0	8.46	326.0	7.70	338.0	8.89	342.0	7.75	8.20
22	355.0	8.46	326.5	7.86	338.0	8.89	342.0	7.75	8.24
Av.		8.57		7.74		9.19		7.81	8.33

Table VIb

Weight in Grams of the Samples of Sucupira and Their Moisture Content for Mr. Kern's House

Wk.	S-64	M.C.	S-66	M.C.	S-68	M.C.	S-71	M.C.	Av. M.C.
0	551.0	7.62	632.5	7.48	484.0	8.54	587.0	7.83	7.87
1	551.0	7.62	628.5	6.80	479.5	7.54	583.0	7.09	7.26
3	547.5	6.93	628.0	6.71	481.0	7.87	584.5	7.37	7.22
5	547.0	6.84	629.5	6.97	480.0	7.65	583.0	7.09	7.14
7	548.5	7.13	628.5	6.80	480.0	7.65	583.0	7.09	7.17
8	549.0	7.23	630.0	7.05	480.5	7.76	584.0	7.27	7.33
10	548.5	7.13	627.0	6.54	479.5	7.54	582.5	7.00	7.05
11	548.0	7.03	628.0	6.71	481.0	7.81	582.5	7.00	7.14
12	548.5	7.13	627.5	6.63	479.5	7.54	582.5	7.00	7.08
13	550.0	7.42	628.0	6.71	480.5	7.76	583.5	7.18	7.27
14	549.5	7.32	628.0	6.71	481.0	7.81	583.5	7.18	7.26
15	549.5	7.32	628.0	6.71	480.0	7.65	583.0	7.09	7.19
16	549.5	7.32	627.5	6.63	480.0	7.65	583.5	7.18	7.20
17	549.0	7.23	628.0	6.71	480.0	7.65	583.0	7.09	7.17
18	550.0	7.42	630.0	7.05	480.5	7.76	582.5	7.00	7.31
19	550.0	7.42	629.0	6.88	480.0	7.65	583.5	7.18	7.28
20	549.5	7.32	629.5	6.97	480.0	7.65	584.0	7.27	7.30
21	549.5	7.32	629.0	6.88	480.0	7.65	584.0	7.27	7.28
22	549.5	7.32	629.5	6.97	480.5	7.76	584.0	7.27	7.33
Av.		7.27		6.84		7.73		7.18	7.26

Table VIc

Weight in Grams of the Samples of Oak and Their Moisture Content for Mr. Kern's House

Wk.	O-36	M.C.	O-38	M.C.	O-44	M.C.	O-46	M.C.	Av. M.C.
0	479.5	9.00	475.5	7.97	469.5	9.29	453.0	8.84	8.78
1	476.5	8.32	472.5	7.29	466.0	8.47	449.0	7.88	7.99
3	476.0	8.21	474.5	7.74	463.5	7.89	450.5	8.24	8.02
5	475.0	7.98	473.0	7.40	463.5	7.89	449.5	8.00	7.82
7	475.0	7.98	472.0	7.18	464.0	8.00	449.5	8.00	7.79
8	475.5	8.09	473.5	7.52	463.0	7.77	450.5	8.24	7.91
10	474.0	7.75	470.5	6.83	462.0	7.54	449.0	7.88	7.50
11	474.0	7.75	470.5	6.83	462.5	7.66	449.0	7.88	7.53
12	474.5	7.87	470.0	6.72	460.5	7.19	448.5	7.76	7.39
13	475.0	7.98	472.0	7.18	463.5	7.89	448.0	7.64	7.67
14	475.5	8.09	473.0	7.40	462.5	7.66	449.0	7.88	7.76
15	475.0	7.98	473.0	7.40	463.0	7.77	448.5	7.76	7.73
16	474.5	7.87	473.0	7.40	462.0	7.54	449.5	8.00	7.70
17	475.0	7.98	472.5	7.29	462.0	7.54	449.5	8.00	7.70
18	474.0	7.75	473.5	7.52	462.0	7.54	449.5	8.00	7.70
19	474.5	7.87	474.0	7.63	463.0	7.77	449.5	8.00	7.82
20	474.5	7.87	473.5	7.52	463.0	7.77	449.5	8.00	7.79
21	474.5	7.87	473.5	7.52	462.5	7.66	449.5	8.00	7.76
22	475.0	7.98	474.0	7.63	463.5	7.89	450.0	8.12	7.91
Av.		8.01		7.37		7.83		8.01	7.80

Table VId

Weight in Grams of the Samples of Maple and [illegible] Moisture

Their Moisture Content for Mr. Kern's House

Wk.	M-17	M.C.	M-21	M.C.	M-23	M.C.	M-24	M.C.	Av. M.C.
0	508.5	8.28	498.0	8.10	488.0	6.69	464.5	7.37	7.61
1	505.0	7.54	494.0	7.23	486.0	6.28	464.0	7.26	7.08
3	505.5	7.64	494.5	7.34	488.0	6.69	465.0	7.49	7.29
5	505.0	7.54	492.0	6.79	486.0	6.28	464.5	7.37	7.00
7	505.0	7.54	492.5	6.90	486.5	6.36	465.0	7.49	7.07
8	506.5	7.86	493.5	7.12	487.5	6.58	466.5	7.84	7.35
10	506.0	7.75	493.0	7.01	486.5	6.36	466.0	7.72	7.21
11	505.5	7.64	494.0	7.23	486.5	6.36	465.0	7.49	7.18
12	506.0	7.75	496.5	7.77	488.0	6.69	464.5	7.37	7.40
13	506.5	7.86	496.5	7.77	489.5	7.02	466.5	7.84	7.62
14	506.0	7.75	496.5	7.77	489.5	7.02	467.0	7.95	7.62
15	505.0	7.54	496.0	7.66	489.0	6.91	466.5	7.84	7.49
16	505.0	7.54	496.0	7.66	488.5	6.80	467.0	7.95	7.49
17	506.0	7.75	494.0	7.23	488.0	6.69	465.5	7.61	7.32
18	507.0	7.96	495.0	7.45	488.0	6.69	467.0	7.95	7.51
19	507.5	8.07	496.5	7.77	489.0	6.91	467.0	7.95	7.68
20	507.5	8.07	495.5	7.55	488.0	6.69	467.0	7.95	7.57
21	507.5	8.07	496.0	7.66	488.0	6.69	467.0	7.95	7.59
22	508.5	8.28	496.5	7.77	489.0	6.91	467.5	8.07	7.76
Av.		7.81		7.46		6.66		7.71	7.42

Graph 3

Average weekly moisture content fluctuations of each species in the Kern house

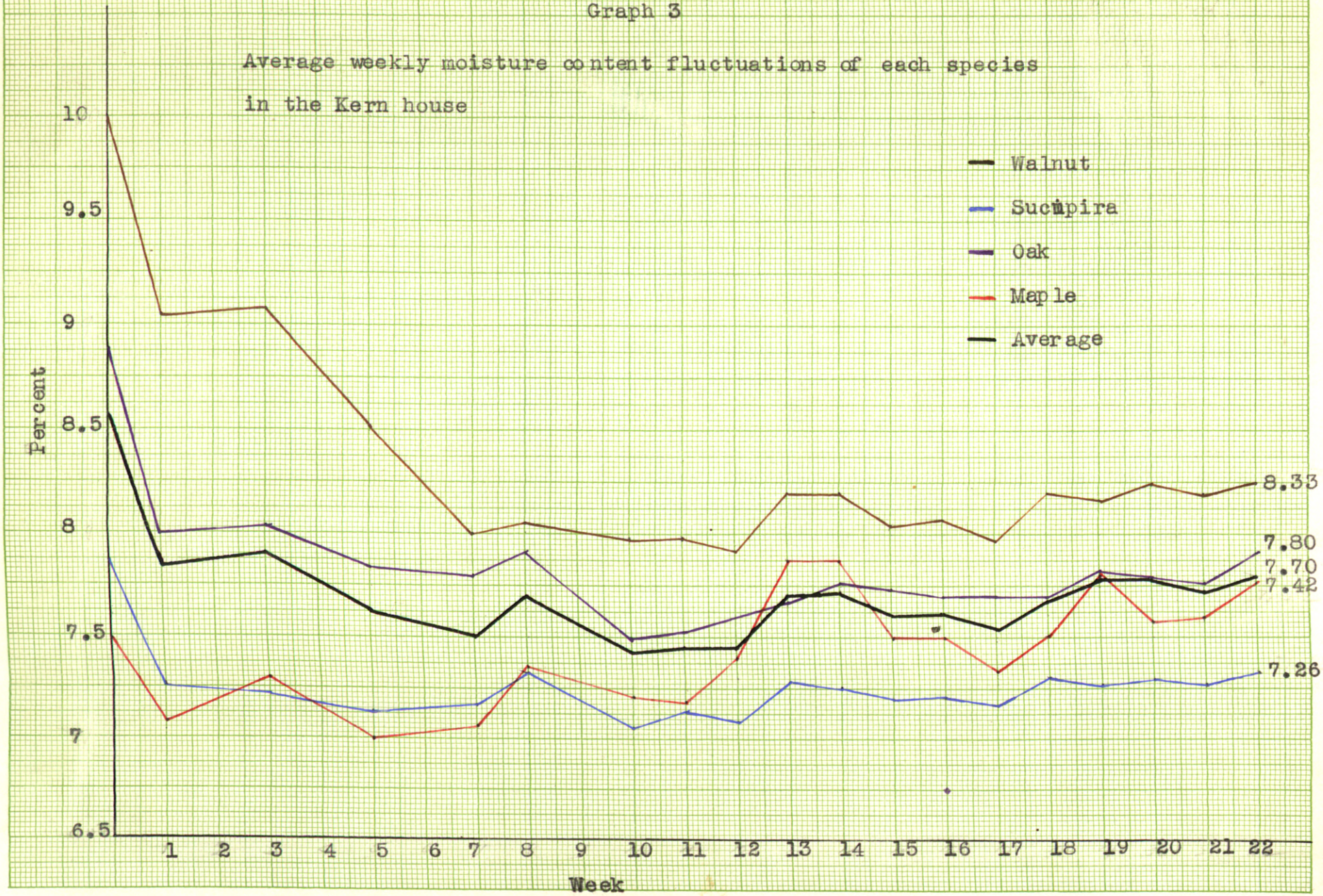


Table VIIa

Weight in Grams of the Walnut Test Pieces and their Corresponding Moisture Contents for Mrs. Trosper's House

Wk.	W-85	M.C.	W-83	M.C.	W-86	M.C.	W-82	M.C.	Av. M.C.
0	347.0	8.64	363.5	8.48	330.0	10.07	318.5	9.87	9.27
1	347.5	8.80	363.5	8.48	328.0	9.41	315.5	8.83	8.88
4	345.5	8.17	361.0	7.73	327.0	9.07	313.5	8.83	8.28
7	346.0	8.33	359.0	7.13	325.0	8.41	312.5	7.80	7.92
9	345.0	8.02	359.0	7.13	323.0	7.74	311.0	7.28	7.54
11	346.5	8.48	359.0	7.13	322.0	7.40	311.5	7.45	7.62
13	345.5	8.17	359.0	7.13	322.0	7.40	311.5	7.45	7.54
15	345.0	8.02	359.0	7.13	323.0	7.74	314.0	8.31	7.80
17	343.0	7.39	359.0	7.13	322.0	7.40	313.0	7.97	7.47
19	345.0	8.02	358.5	7.28	322.5	7.57	312.0	7.62	7.62
21	344.5	7.86	359.5	7.28	322.0	7.40	312.5	7.80	7.59
22	345.0	8.02	361.0	7.73	323.5	7.91	314.0	8.31	7.99
Av.		8.16		7.48		8.13		8.07	7.96

Table VIIb

Weight in Grams of the Samples of Sucupira and Their Moisture Content for Mrs. Trosper's House

Wk.	S-58	M.C.	S-55	M.C.	S-57	M.C.	S-59	M.C.	Av. M.C.
0	570.0	6.82	569.5	7.13					6.98
1	569.0	6.63	568.5	6.94					6.79
4	570.5	6.92	566.5	6.57					6.75
7	570.5	6.92	568.0	6.85	517.0	7.06	538.0	7.19	7.01
9	567.5	6.35	566.5	6.57	516.0	6.85	535.5	6.69	6.69
11	571.0	7.01	566.5	6.57	516.0	6.85	537.0	6.99	6.86
13	571.5	7.10	565.5	6.38	516.0	6.85	537.0	6.99	6.83
15	571.0	7.01	566.0	6.47	516.5	6.96	537.5	7.09	6.88
17	570.5	6.92	566.5	6.57	517.0	7.06	538.0	7.19	6.94
19	571.5	7.10	566.5	6.57	517.5	7.17	538.0	7.19	7.01
21	572.0	7.20	566.0	6.47	517.0	7.06	537.0	6.99	6.93
22	573.5	7.48	567.0	6.66	518.0	7.27	538.5	7.29	7.18
Av.		6.96		6.65		7.01		7.10	6.90

Table VIIc

Weight in Grams of the Samples of Oak and Their Moisture Content for Mrs. Trosper's House

Wk.	O-29	M.C.	O-30	M.C.	O-37	M.C.	O-32	M.C.	Av. M.C.
0	471.0	7.90	449.0	8.64	451.0	8.36	454.5	9.23	8.53
1	471.0	7.90	447.5	8.27	449.5	8.00	454.0	9.11	8.32
4	469.5	7.56	446.5	8.03	442.5	7.52	452.0	8.63	7.94
7	468.0	7.22	446.5	8.03	446.5	7.28	452.0	8.63	7.79
9	468.5	7.33	447.0	8.15	447.0	7.40	449.0	7.91	7.70
11	468.0	7.22	446.5	8.03	446.5	7.28	450.0	8.15	7.70
13	467.5	7.10	446.5	8.03	446.0	7.16	450.0	8.15	7.61
15	468.0	7.22	446.5	8.03	444.5	6.80	450.0	8.15	7.58
17	469.5	7.56	446.5	8.03	447.5	7.52	450.0	8.15	7.82
19	469.0	7.45	446.5	8.03	446.0	7.16	449.5	8.03	7.67
21	469.0	7.45	446.5	8.03	446.0	7.16	449.5	8.03	7.67
22	471.0	7.90	447.5	8.27	448.0	7.64	450.5	8.27	8.02
Av.		7.50		8.13		7.44		8.37	7.86

Table VIId

Weight in Grams of the Samples of Maple and Their Moisture Content for Mrs. Trosper's House

Wk.	M-10	M.C.	M-6	M.C.	M-9	M.C.	M-8	M.C.	Av. M.C.
0	491.5	7.88	513.5	8.04	507.5	8.02	450.0	8.17	8.03
1	491.0	7.77	511.5	7.62	506.5	7.81	448.0	7.69	7.72
4	490.5	7.66	509.0	7.09	504.0	7.28	446.5	7.33	7.34
7	490.5	7.66	508.0	6.88	504.5	7.39	445.5	7.09	7.26
9	488.5	7.22	506.5	6.56	501.5	6.75	444.0	6.73	6.82
11	490.0	7.55	508.0	6.88	500.5	6.53	445.0	6.97	6.98
13	490.0	7.55	506.5	6.56	500.5	6.53	445.5	7.09	6.93
15	490.0	7.55	509.0	7.09	501.0	6.64	446.5	7.33	7.40
17	489.5	7.44	509.0	7.09	503.5	7.17	446.0	7.21	7.23
19	489.5	7.44	510.5	7.41	504.5	7.39	446.5	7.33	7.39
21	489.5	7.44	510.5	7.41	504.5	7.39	446.5	7.33	7.39
22	490.0	7.55	511.5	7.62	503.5	7.17	448.5	7.81	7.54
Av.		7.56		7.18		7.26		7.34	7.34

Graph 4

Average weekly moisture content fluctuations of each species in the Trosper house

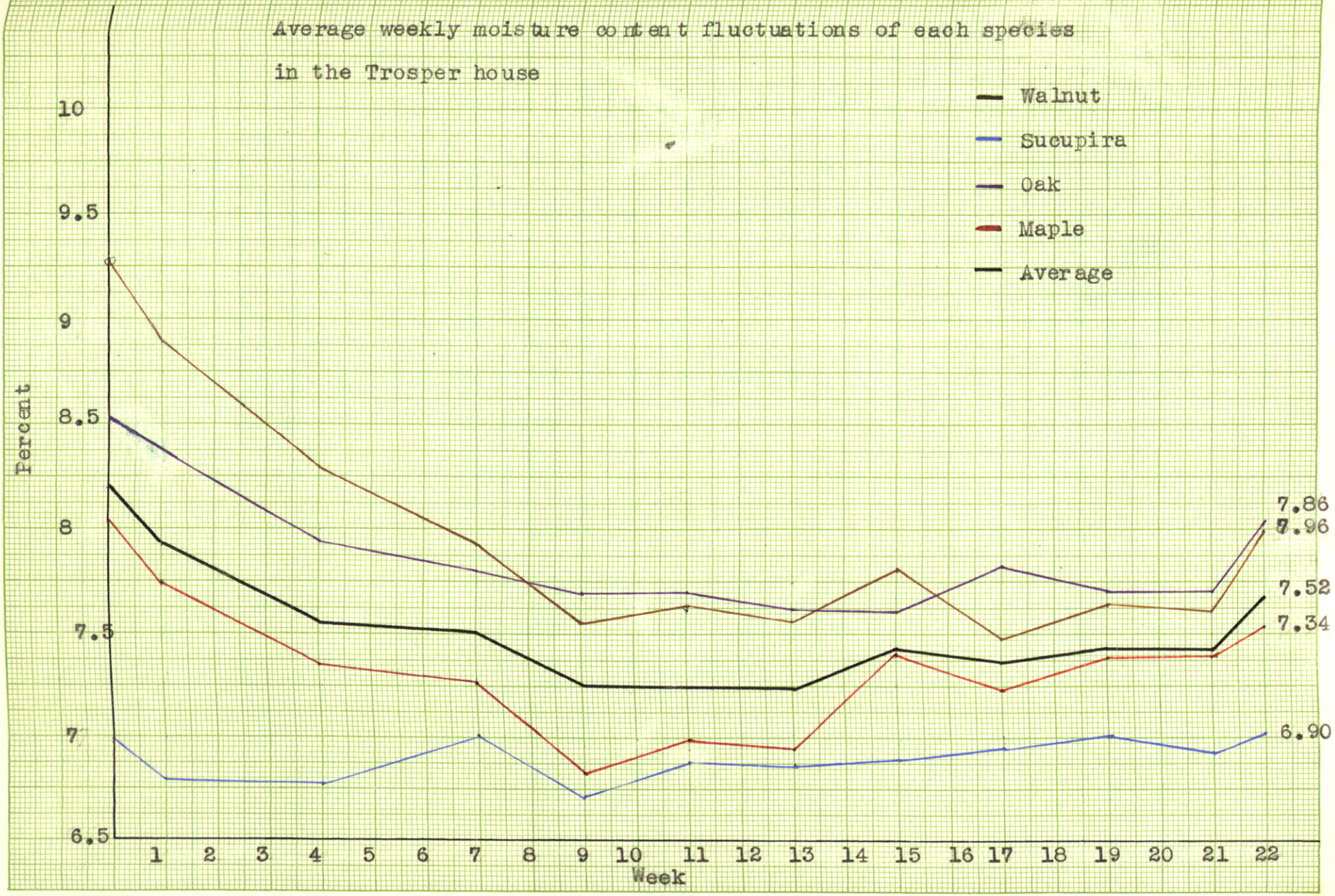


Table VIIIa

Average Moisture Content of the Walnut for each House
and
Average Moisture Content of the Walnut for all Houses

Moisture Content

Week	Patten	Tracy	Kern	Trosper	Average for all Houses
0	10.23	10.30	10.00	9.27	9.95
1	10.38	9.54	9.04	8.88	9.46
3	9.44	9.09	9.08		9.20
4	9.63	8.46		8.28	8.79
5	9.11	8.63	8.52		8.75
7	9.11	8.67	8.00	7.92	8.43
8	8.72	8.41	8.25		8.12
9	8.84	8.45		7.54	8.28
10	8.59	7.99	7.96		8.18
11	8.15	7.86	7.96	7.68	7.90
12	7.82	8.08	7.92		7.94
13	8.19	8.08	8.20	7.54	8.00
14	8.27	7.95	8.20		8.14
15	8.30	8.45	8.04	7.80	8.15
16	8.39		8.08		8.24
17	8.35	8.07	7.96	7.47	7.96
18	7.83	7.99	8.20		8.01
19	8.47	8.33	8.16	7.62	8.15
20	8.47	8.32	8.24		8.34
21	8.59	8.36	8.20	7.59	8.19
22	8.23	8.66	8.24	7.99	8.28
Average	8.72	8.48	8.33	7.96	8.37

Table VIIIb

Average Moisture Content of the Sucupira for each House
and
Average Moisture Content of the Sucupira for all Houses

	Moisture Content							
Week	Patten	Tracy	Kern	Trosper	Average for all Houses			
0	7.62	7.35	7.87	6.98	7.46			
1	7.69	7.31	7.26	6.79	7.26			
3	7.49	7.25	7.22		7.32			
4	7.39	6.96		6.75	7.03			
5	7.15	6.94	7.14		7.08			
7	7.14	7.06	7.17	7.01	7.10			
8	6.92	7.02	7.33		7.09			
9	6.94	6.78		6.69	6.80			
10	6.89	6.75	7.05		6.90			
11	6.97	6.65	7.14	6.86	6.91			
12	6.82	6.83	7.08		6.91			
13	6.92	6.87	7.27	6.83	6.97			
14	6.97	6.75	7.26		6.99			
15	6.96	6.87	7.19	6.88	6.98			
16	6.93		7.20		7.07			
17	6.86	6.88	7.17	6.94	6.96			
18	6.65	6.77	7.31		6.91			
19	6.86	6.96	7.28	7.01	7.03			
20	7.01	6.99	7.30		7.10			
21	7.14	7.01	7.28	6.93	7.09			
22	7.05	7.13	7.33	7.18	7.17			
Average	7.06	6.96	7.26	6.90	7.05			

Table VIIIc

Average Moisture Content of the Oak for each House
and
Average Moisture Content of the Oak for all Houses

Week	Moisture Content							
	Patten	Tracy	Kern	Trosper	Average for all Houses			
0	8.68	9.08	8.78	8.53	8.77			
1	8.97	8.87	7.99	8.32	8.54			
3	8.80	8.54	8.02		8.45			
4	8.75	8.15		7.94	8.28			
5	8.45	8.21	7.82		8.16			
7	8.70	8.30	7.79	7.79	8.15			
8	8.53	8.14	7.91		8.19			
9	8.63	8.12		7.70	8.17			
10	8.47	7.93	7.50		7.97			
11	8.38	7.91	7.53	7.70	7.88			
12	8.38	7.90	7.39		7.89			
13	8.38	7.84	7.67	7.61	7.88			
14	8.53	7.69	7.76		7.99			
15	8.47	7.75	7.73	7.58	7.88			
16	8.77		7.70		8.24			
17	8.58	7.66	7.70	7.82	7.94			
18	8.20	7.48	7.70		7.79			
19	8.68	8.02	7.82	7.67	8.05			
20	8.71	7.96	7.79		8.15			
21	8.79	8.02	7.76	7.67	8.06			
22	8.82	8.17	7.91	8.02	8.23			
Average	8.60	8.09	7.80	7.86	8.09			

Table VIIId

Average Moisture Content of the Maple for each House
and
Average Moisture Content of the Maple for all Houses

	Moisture Content				
Week	Patten	Tracy	Kern	Trosper	Average for all Houses
0	8.05	7.91	7.61	8.03	7.90
1	8.05	7.80	7.08	7.72	7.66
3	8.23	7.85	7.29		7.79
4	8.15	7.50		7.34	7.66
5	7.86	7.45	7.00		7.44
7.	7.77	7.56	7.07	7.26	7.26
8	7.64	7.47	7.35		7.49
9	7.75	7.23		6.82	7.27
10	7.77	7.01	7.21		7.33
11	7.83	7.04	7.18	6.98	7.26
12	7.83	7.15	7.40		7.46
13	7.77	7.04	7.62	6.93	7.34
14	8.02	7.04	7.62		7.56
15	8.01	7.31	7.49	7.40	7.55
16	8.10		7.49		7.80
17	8.13	7.34	7.32	7.23	7.51
18	7.85	7.29	7.51		7.55
19	8.26	7.56	7.65	7.39	7.72
20	8.31	7.55	7.57		7.81
21	8.40	7.58	7.59	7.39	7.74
22 *	8.45	7.77	7.76	7.54	7.88
Average	8.01	7.42	7.41	7.34	7.55

Graph 5

Weekly average moisture content fluctuation of each species for all houses averaged compared to the Weekly average moisture content fluctuation of all wood samples regardless of species for all houses.

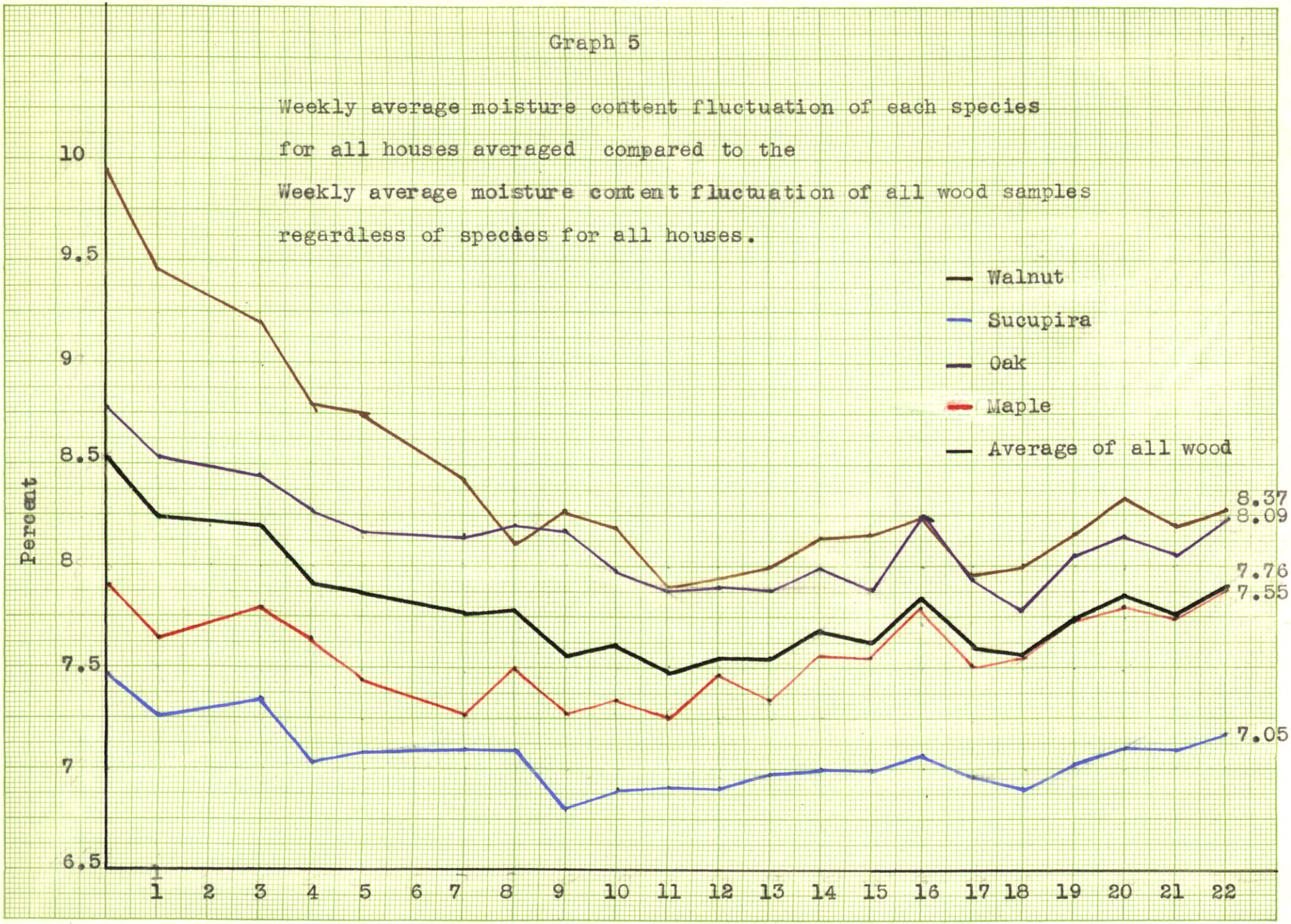


Table IX

Average Moisture Content of all Wood Samples in Each House
and
Average Moisture Content of all Wood Samples in All Houses

	Moisture Content							
Week	Patten	Tracy	Kern	Trosper	Average for all Houses			
0	8.64	8.66	8.57	8.20	8.52			
1	8.77	8.38	7.84	7.93	8.23			
3	8.49	8.18	7.90		8.19			
4	8.48	7.77		7.55	7.93			
5.	8.14	7.81	7.62		7.86			
7.	8.18	7.90	7.51	7.50	7.77			
8	7.95	7.76	7.71		7.81			
9	7.80	7.65		7.24	7.56			
10	7.93	7.42	7.43		7.59			
11	7.79	7.37	7.45	7.29	7.48			
12	7.71	7.49	7.45		7.55			
13	7.82	7.46	7.59	7.23	7.55			
14	7.95	7.36	7.71		7.67			
15	7.94	7.60	7.61	7.42	7.64			
16	8.05		7.62		7.84			
17	7.98	7.49	7.54	7.37	7.60			
18	7.63	7.38	7.68		7.56			
19	8.07	7.72	7.74	7.42	7.74			
20	8.13	7.71	7.73		7.86			
21	8.23	7.74	7.71	7.40	7.77			
22	8.14	7.93	7.81	7.68	7.89			
Average	8.09	7.74	7.70	7.52	7.76			

Graph 6

Weekly average moisture content fluctuations of all wood samples regardless of species, in each house and also for all houses

Table X

Weekly and Final Average Temperature and Relative Humidities for Doctor's Pattens Home

Week	Temperature --- degrees F						Relative Humidity---- Per cent					
	Down Stairs			Up stairs		Average for the House	Down stairs			Up stairs		Average for the House
	Liv. R	Din.R	Study	Bed R	Sew·R		LLiv. R	Din. R	Study	Bed R	Sew.R	
7	72	71		69		70.6	24	23		21		25.7
8	72	72	75	71		72.5	36	36	30	41		35.8
9	69	71	72	70	78	72.0	28	30	31	29	34	30.4
10	73	74	72	68		71.8	35	46	40	54		41.3
11	71	71	72	66		69.8	33	37	37	48		38.8
12	69	70.5	71		68	69.6	40	40	40		42	42.4
13	73	71.5	73			72.5	33.5	33.5	33			35.7
14	72	72	73	69	70	71.6	47	47	44	55	49	48.4
15	69	69	69	70	70	69.4	55	55	59	59	59	57.7
16	71	70	72	70	72	71.0	56	57	60	57	60	58.0
17	71	71	72	67		70.3	36	37	39	45		39.3
18	73.5	73	73	73	74	73.3	51	50	53	55	56	53.0
19	72	71	72	72	73	71.8	48	48	49	50	46	48.2
20	78	77	80	75	77	77.4	49	48	41	51	52	48.2
21	78	75	76	76	78	76.6	56	61	56	59	56	57.6
22	69	72	71	70	70	70.4	47	42	41	44	44	43.6
			Average			71.9			Average			44.2

Table XI

Weekly and Final Average Temperatures and Relative Humidities for Professor Tracy's Home

Week	Temperature---degrees F					Relative Humidity---Per cent				
	Down stairs			Upstairs	Average for the House	Down stairs			Upstairs	Average for the House
	Liv. R	Din. R	Kitch.	Study		Liv R.	Din. R	Kitch.	Study	
7	71	71		70.5	70.8	30	30		30	30
8	71	72	72	72	71.8	33	28	31	31	30.8
9	73	73	77	73	74	29	29	33	29	30
10	73	72	74	72	72.8	42	42	47	45	44
11	68	70	75	70	70.8	46	44	44	44	44.5
12	69	71	74	71	71.3	43	41	41	41	41.5
13	68.5	69.5	72.5	70.5	70.3	33	33	27	33	31.5
14	70	72	73	71	71.5	55	53	57	56	55.3
15	69	70	72	74	71.3	55	55	53	47	52.5
16	67	67	70	68.5	68.1	49	47	36	38	42.5
18	73	73.5	73	77	74.1	53	50	51	45	49.8
19	72	73	74	75	73.5	53	50	47	47	49.3
20	76.5	79	79	79	78.4	50	43	43	43	44.8
21	76.5	78	76	78	77.1	59	56	62	60	59.3
22	69.5	72	76	71.5	72.5	42	38	34	40	38.5
22			Average		72.6			Average		43.0

Table XII

Weekly and Final Average Temperature and Relative Humidities for Mrs. Kern's Home

Week	Temperature-----degrees F						Relative Humidity----Per cent					
	Down stairs			Up stairs		Average for the House	Down stairs			Up stairs		Average for the House
	Liv. R	Din.R	Study	Hall	Sew. R		Liv.R	Din. R	Study	Hall	Sew. R	
7	71	71		74	74	72.5	20	20		17	23	20
8	76	74	76	74	72	74.4	31	33	25	33	34	31.2
9	78	78.5	78	74	72	76.1	21	23	21	29	28	24.4
10												
11	72	76	72	75	74	73.8	45	41	45	44	43	43.6
12	76	74	75	74	73	74.4	34	36	37	39	39	37
13	74	73.5	74	71	70	72.5	36	34	38	43	44	39
14	74	76	74	75	74	74.7	59	55	59	58	61	58.4
15	74	75	75	74	74	74.4	54	58	54	58	60	56.8
16	75	75.5	75	74.5	74	74.4	54	55	54	59	61	56.6
17	77	75.5	77	74.5	74	75.6	28	34	28	33	33	31.2
18	78	77.5	78	75	74.5	76.6	39	46	39	47	46	43.2
19	75	74.5	75	74	73	74.3	40	42	44	47	46	43.8
20	77	76.5	76	76	75.5	76.2	45	49	49	55	52	50
21	77	77	78	76	76	76.8	56	59	53	59	59	57.2
22	76	78	76	76	75	76.2	34	32	34	34	37	34.2
				Average		74.9		32		Average		41.8

Table XIII

Weekly and Final Average Temperature and Relative Humidities for Mrs. Trosper's Home

Week	Temperature---degrees F: Down stairs Liv. R	Down stairs Din.R	Up stairs Boys R.	Up stairs Bed R.	Up stairs Girls	Average for the House	Relative Humidity---Per cent: Down stairs Liv. R	Down stairs Din. R	Up stairs Boys R	Up stairs Bed R.	Up stairs Girls	Average for the House
7	74.5	72	72	74.5		73.3	25	29	28	22		26
9	70	69	74	75	70	71.6	40	35	29	27	33	32.8
11	73	72	73	74	72	72.8	46	45	42	37	33	40.6
13	72	71	75	75	74	73.4	34	37	30	30	33	32.8
15	69.5	68	74.5	76	72	72.0	34	34	25	28	30	30.2
17	72	72	73.5	75.5	74	73.4	57	47	59	56	56	57
19	71	68	70.5	69.5	67	69.1	35	40	38	41	41	39
21	71	70	70.5	72	70	70.7	45	48	44	42	48	45.4
22	70.5	70.5	76.5	74	77	72.5	36	36	27	31	26	31.2
				Average		72.1				Average		37.2

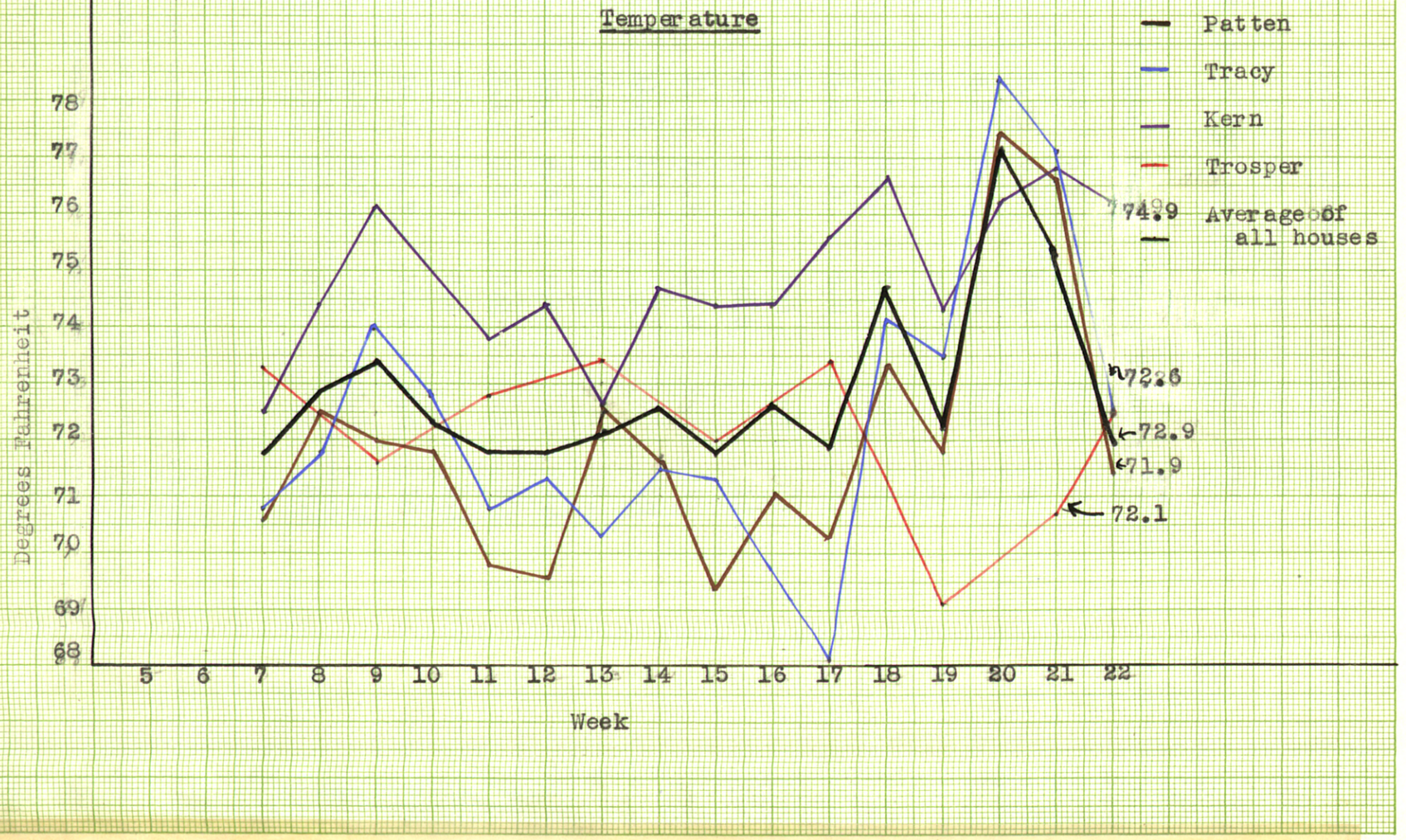
Table XIV

Weekly Average Temperatures and Relative Humidities of Each House and the Weekly and Final Average for all Houses

Week	Temperature---degrees F					Relative Humidity -----Per cent				
	Patten	Kern	Tracy	Trosper	Average for all Houses	Patten	Kern	Tracy	Trosper	Average for all Houses
7	70.6	72.5	70.8	73.3	71.8	25.7	20.0	30.0	26.0	25.4
8	72.5	74.4	7118		72.9	35.8	31.2	30.8		32.6
9	72.0	76.1	74.0	71.6	73.4	30.4	24.4	30.0	32.8	29.4
10	71.8		72.8		72.3	41.3		44.0		42.7
11	69.8	73.8	70.8	72.8	71.8	38.8	43.6	44.5	40.6	41.9
12	69.6	74.4	71.3		71.8	42.4	37.0	41.5		40.3
13	72.5	72.5	70.3	73.4	72.2	39.1	39.0	31.5	32.8	35.6
14	71.6	74.7	71.5		72.6	48.4	58.4	55.3		54.0
15	69.4	74.4	71.3	72.0	71.8	57.7	56.8	52.5	30.2	49.3
16	71.0	74.4			72.7	58.0	56.6			57.3
17	70.3	75.6	68.1	73.4	71.9	39.3	31.2	42.5	57.0	42.5
18	73.3	76.6	74.1		74.7	53.0	43.2	49.8		48.7
19	71.8	74.3	73.5	69.1	72.2	48.2	43.8	49.3	39.0	45.1
20	77.4	76.2	78.4		77.3	48.2	50.0	44.8		47.7
21	76.6	76.8	77.1	70.7	75.3	57.6	57.2	59.3	45.4	54.9
22	70.4	76.2	72.5	72.5	72.9	43.6	34.2	38.5	31.2	36.9
Average	71.9	74.9	72.6	72.1	72.9	44.2	41.8	43.0	37.2	41.6

Graph 7

Weekly Average Temperatures and Relative Humidities for each House and for all Houses



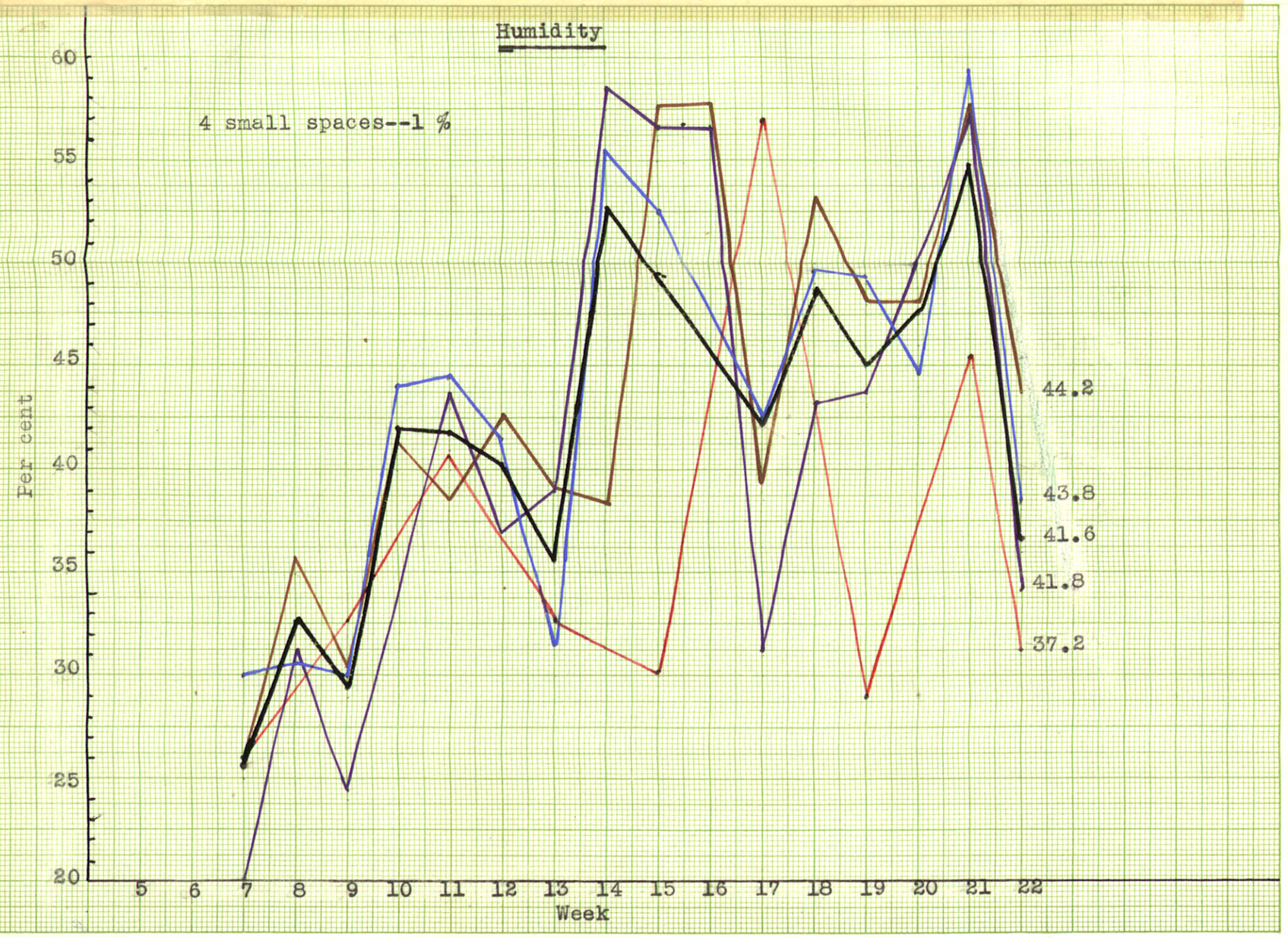


Table XV

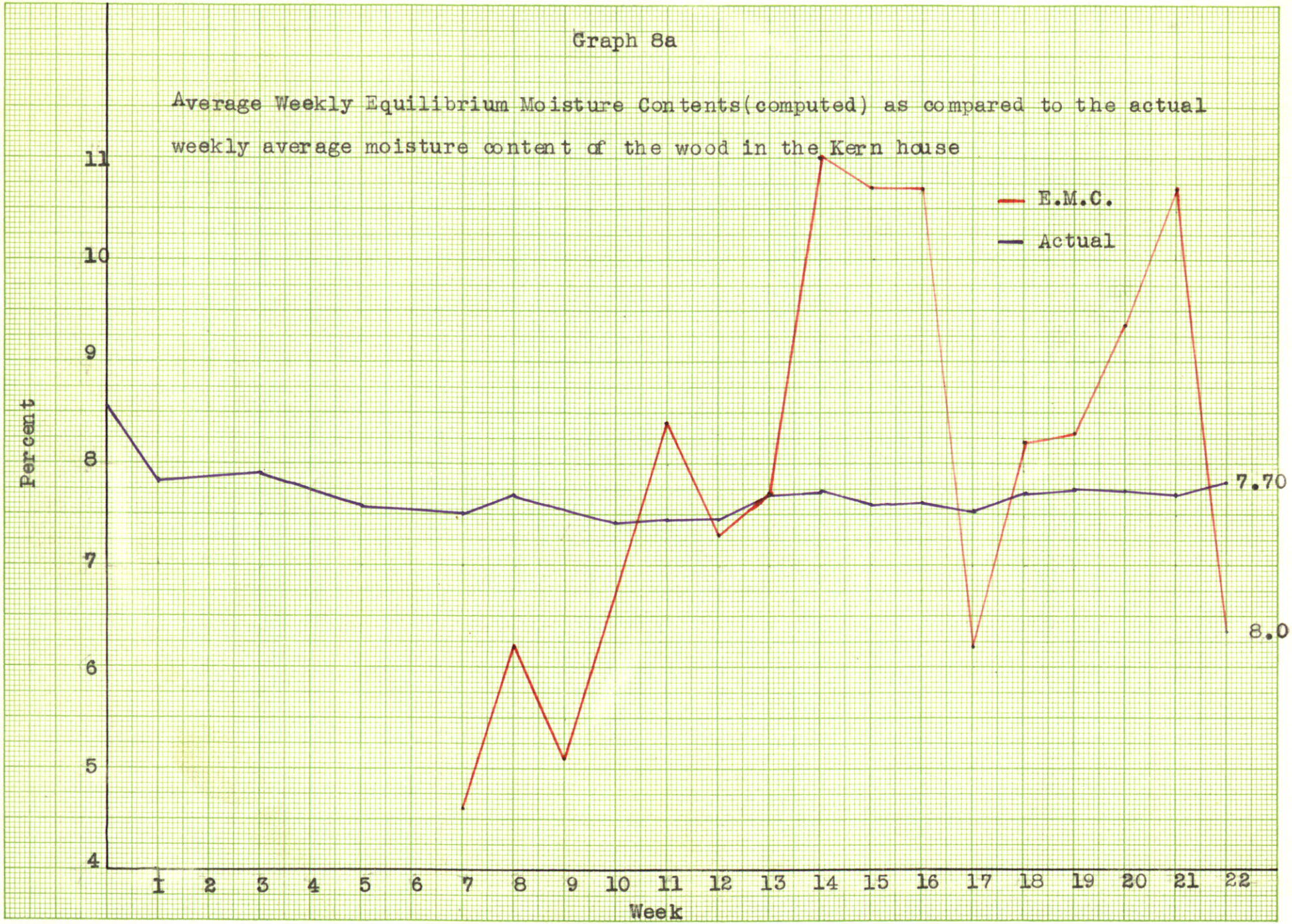
Equilibrium Moisture Content Corresponding to the Weekly and Final Average Temperature and Relative Humidity of Each Individual House and for all Houses**

Week	Patten	Kern	Tracy	Trosper	Average for all Houses
7	5.5	4.6	6.1	5.5	5.4
8	7.0	6.2	6.3		6.5
9	6.2	5.1	6.0	6.6	6.0
10	8.0		8.5		8.3
11	7.8	8.4	8.6	7.7	8.1
12	8.3	7.3	8.0		7.9
13	7.7	7.7	6.4	6.6	7.1
14	9.3	11.0	10.5		10.3
15	11.0	10.7	10.0	6.1	9.5
16	1100	10.7			10.8
17	7.8	6.2	8.4	10.8	8.3
18	10.1	8.2	9.4		9.2
19	9.1	8.3	9.3	7.8	8.6
20	9.0	9.3	8.4		8.9
21	10.8	10.7	11.1	8.6	10.3
22	8.4	6.7	7.6	6.3	7.3
Average	8.5	8.1	8.3	7.3	8.3

** These values are not the actual Equilibrium Moisture Contents of the test pieces but they represent the equilibrium which the samples would have reached had they been exposed to each condition constantly and for a sufficient period of time

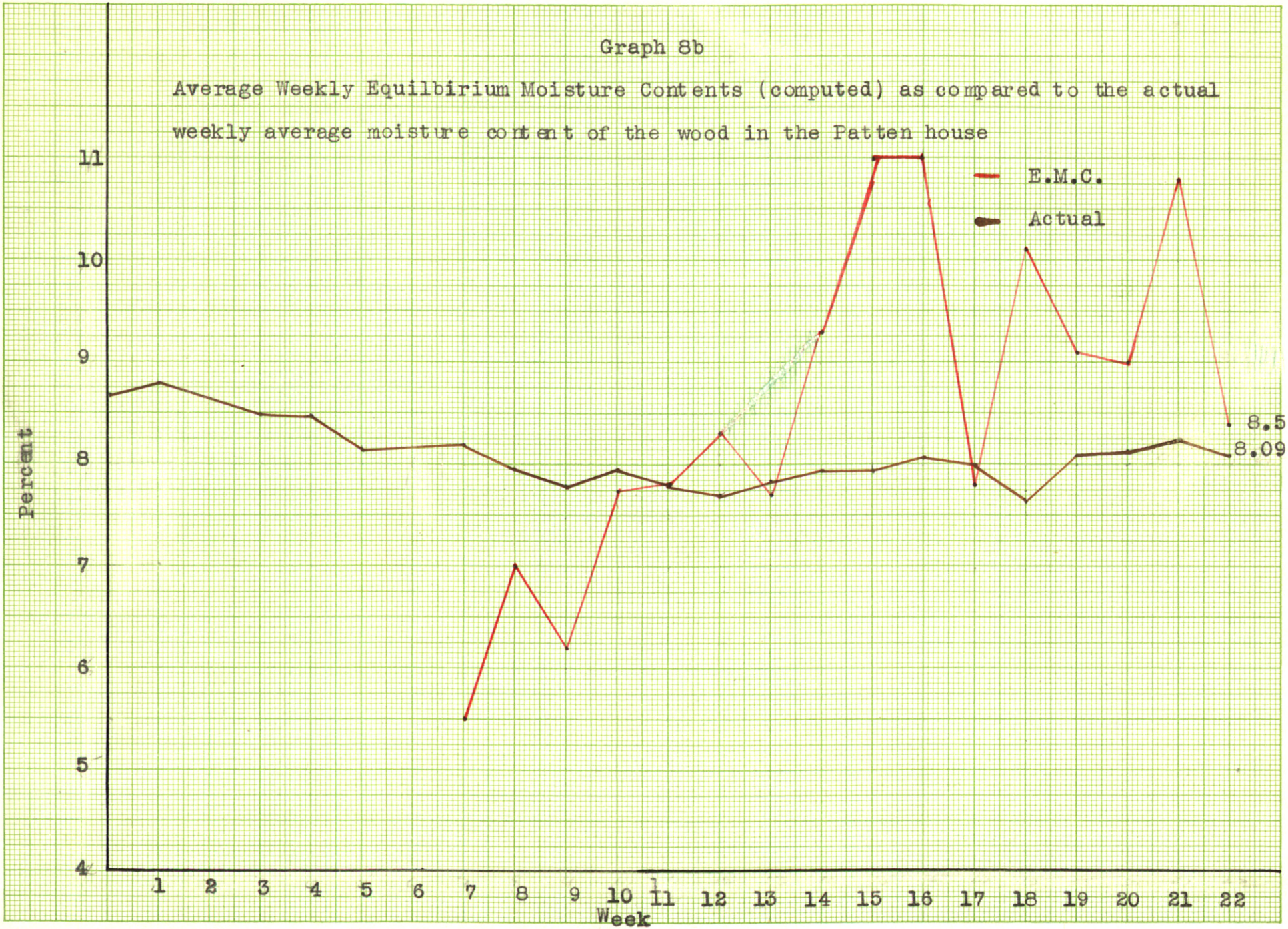
Graph 8a

Average Weekly Equilibrium Moisture Contents(computed) as compared to the actual weekly average moisture content of the wood in the Kern house



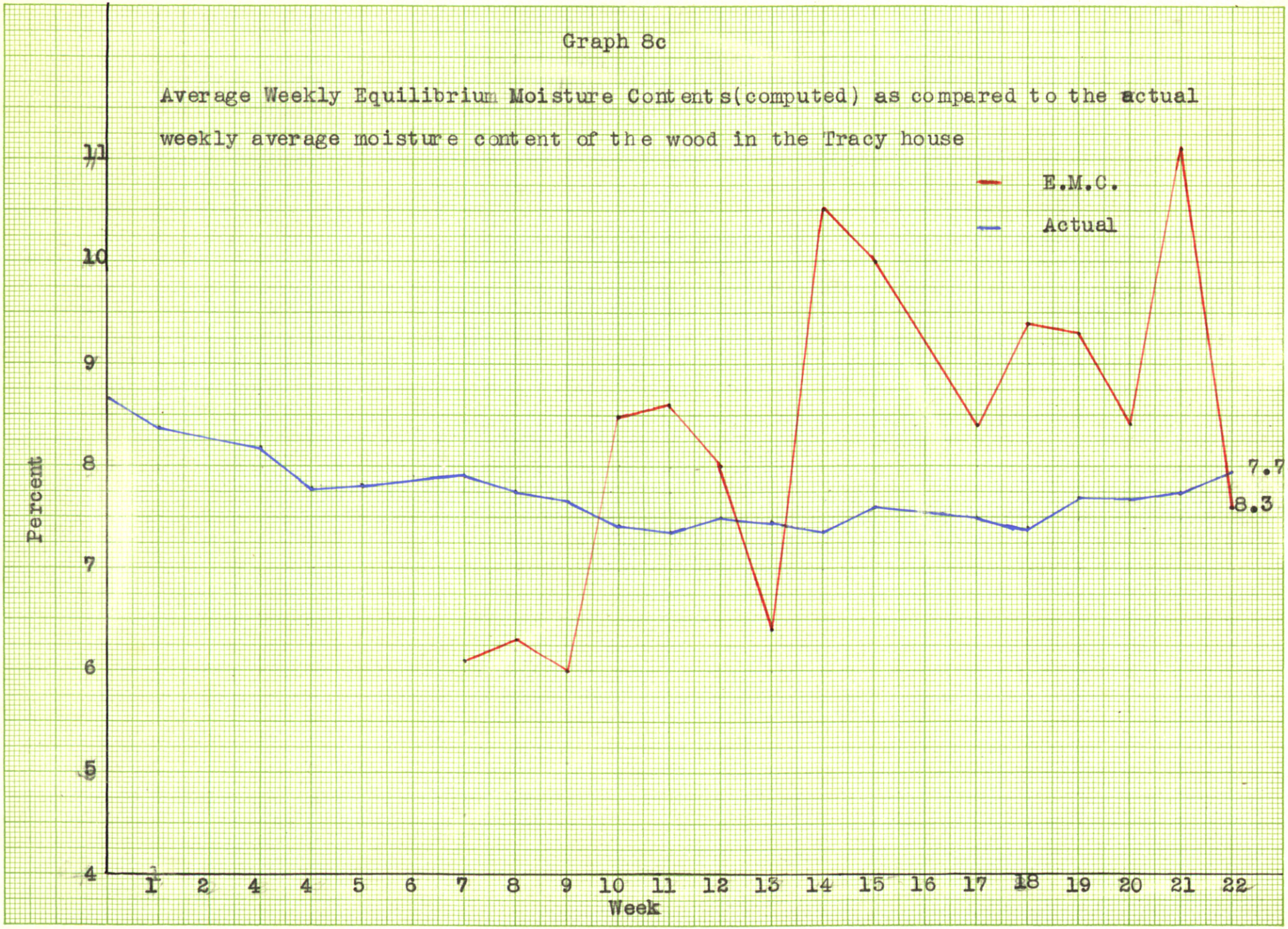
Graph 8b

Average Weekly Equilbirium Moisture Contents (computed) as compared to the actual weekly average moisture content of the wood in the Patten house



Graph 8c

Average Weekly Equilibrium Moisture Contents(computed) as compared to the actual weekly average moisture content of the wood in the Tracy house

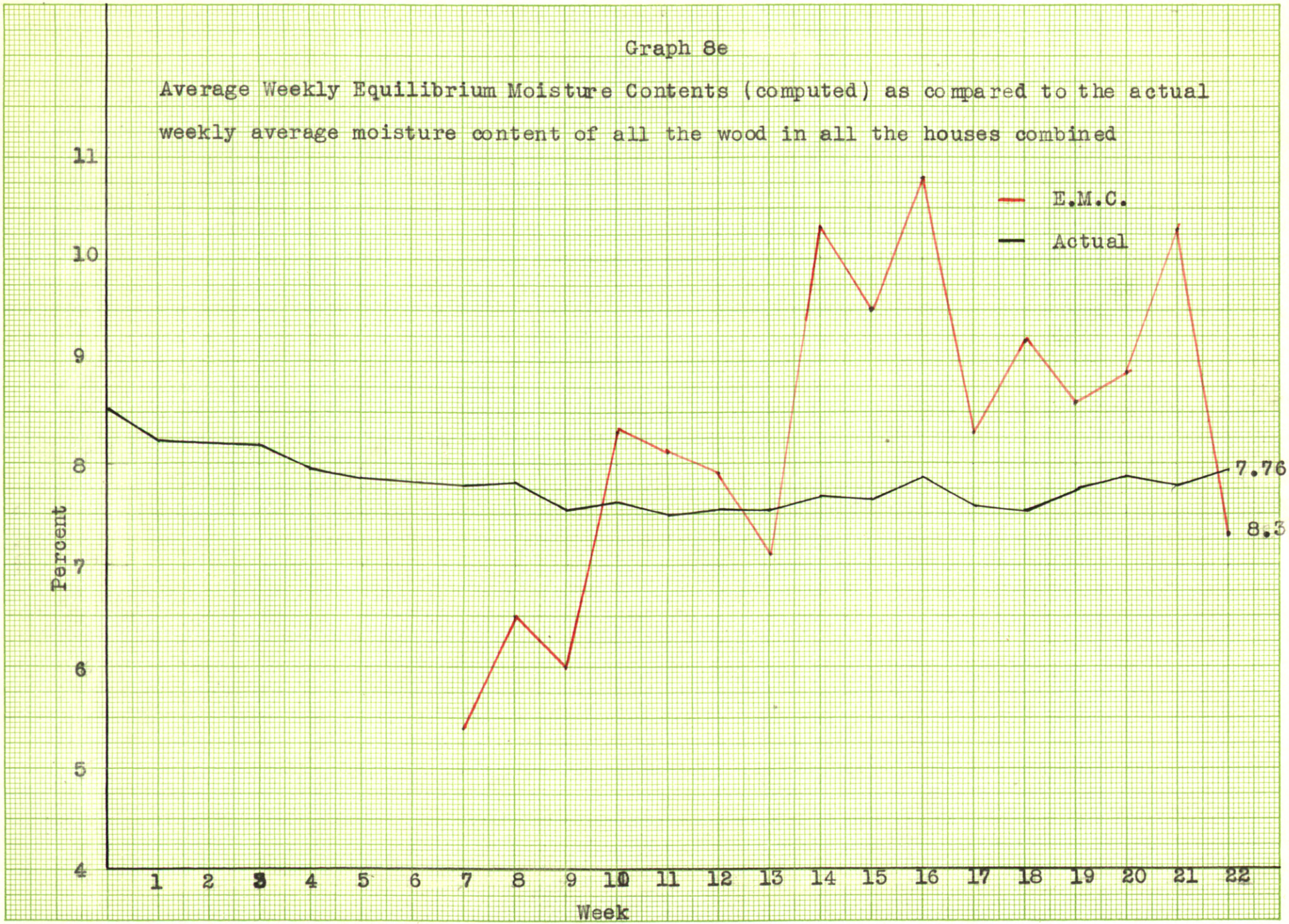


Graph 8d

Average Weekly Equilibrium Moisture Contents(computed) as compared to the actual weekly average moisture content of the wood in the Trosper house

Graph 8e

Average Weekly Equilibrium Moisture Contents (computed) as compared to the actual weekly average moisture content of all the wood in all the houses combined



Graph 9

Final Average Moisture Content of the Wood Upstairs and Downstairs Compared