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DRUG TOPICS.*

No. 5. Curing of Japanese Burdock.

BY W. E. CLEOPHAS.[1]

Through the kindness of Mr. Susuki a small package of Japanese burdock seeds was obtained. The root of the Japanese burdock is also used as a vegetable. The roots are reported to acquire a large diameter.

Dr. Fischer reported that he had obtained large plants, and late in October dug up roots almost an inch in diameter or a little more. When cooked and prepared with a white sauce they reminded him of the taste and flavor of the egg plant.

For the purpose of comparing them as a drug with American burdock, the plants raised by Edward Kremers in 1909 were utilized. The Japanese seeds had been sown in spring in the same place where the year before American burdock had been raised. Unfortunately, for an exact comparison, the plants were not thinned out as early as they ought to have been. As a result the plants did not develop as finely as did those of the previous year.

FALL COLLECTION. For the purpose of curing, roots were dug up from time to time after the middle of October. Following the method of the previous year, part of the roots were cut longitudinally, *i. e.*, the conventional way, and partly into cross sections. Some were dried at room temperature, others at different temperatures in drying ovens. It having been found that 70° apparently was the best temperature for curing the roots, a beginning was made with this temperature, other temperatures being selected both upwards and downwards at intervals of ten degrees.

Drying at 70°. In a preliminary experiment no hourly record was made of the loss of water due to drying. At the end of about 9 hours, 92.49 grammes of cross sections weighed 25.32 Gm., hence a total loss in weight of 67.17 Gm. or 72.6 percent. 139.88 of the longitudinal sections weighed 37.75 Gm. at the end of about seventeen hours, hence a loss in weight of 102.05 Gm. or 72.9 percent.

* From the Laboratory of Edward Kremers.

[1] Walter E. Cleophas, "The Curing of Burdock," Thesis, University of Wisconsin, 1910.

In a second experiment the loss of water was recorded at regular intervals as recorded in the following table:

Length of exposure in hours.	Longitudinal Sections.			Cross Sections.		
	Weight of roots.	Loss of weight per hour.	Aggregate percentage loss.	Aggregate percentage loss.	Loss of weight per hour.	Weight of roots.
	143.8 Gm.	.....	.....	.....	.....	137.15 Gm.
1	109.5 Gm.	34.30 Gm.	23.8 p. c.	.....	.....	.....
2	72.5 Gm.	34.30 Gm.	49.5 p. c.	23.95 p. c.	32.85 Gm.	104.3 Gm.
3	55.55 Gm.	16.95 Gm.	61.36 p. c.	48.00 p. c.	33.0 Gm.	71.3 Gm.
4	48.7 Gm.	7.85 Gm.	66.13 p. c.	64.27 p. c.	22.3 Gm.	49.0 Gm.
5	43.15 Gm.	5.55 Gm.	69.99 p. c.	69.34 p. c.	6.95 Gm.	42.05 Gm.
6	42.5 Gm.	0.65 Gm.	70.44 p. c.	71.57 p. c.	3.05 Gm.	39.0 Gm.
7	41.7 Gm.	0.70 Gm.	71.00 p. c.	72.22 p. c.	0.9 Gm.	38.1 Gm.
8	41.3 Gm.	0.40 Gm.	71.27 p. c.	72.35 p. c.	0.18 Gm.	37.92 Gm.
9	41.0 Gm.	0.30 Gm.	71.48 p. c.	72.35 p. c.	0.00 Gm.	37.92 Gm.
10	40.75 Gm.	0.25 Gm.	71.66 p. c.	72.35 p. c.	0.00 Gm.	37.92 Gm.
11	40.50 Gm.	0.25 Gm.	71.83 p. c.	.....	.....	.....
12	40.30 Gm.	0.20 Gm.	71.97 p. c.	.....	.....	.....
13	40.10 Gm.	0.20 Gm.	72.11 p. c.	.....	.....	.....
14	39.95 Gm.	0.15 Gm.	72.21 p. c.	.....	.....	.....
15	39.80 Gm.	0.15 Gm.	72.32 p. c.	.....	.....	.....
16	39.70 Gm.	0.10 Gm.	72.39 p. c.	.....	.....	.....
17	39.70 Gm.	0.00 Gm.	72.39 p. c.	.....	.....	.....
18	39.70 Gm.	0.00 Gm.	72.39 p. c.	.....	.....	.....

Drying at 80°. 95.25 Gm. of cross sections, at the end of about 8 hours, weighed 25.5 Gm., a total loss in weight of 69.75 Gm. or 73.3 percent.

147 Gm. of longitudinal sections weighed 41.04 Gm. at the end of about 15 hours, a loss in weight of 105.96 g. or 72.7 percent.

SPRING COLLECTION. In the spring of 1910, roots were collected from the garden of Professor Kremers. They were thoroughly cleansed of dirt, cut into longitudinal and cross sections and dried at 60°, 80° and 90° C. The loss of weight was determined hourly, and the percentages computed. As compared with results obtained in the fall of 1909 the results vary considerably.

The results obtained with the roots collected in the spring are herewith tabulated:

Drying at 60°.

Length of exposure in hours.	Longitudinal Sections.			Cross Sections.		
	Weight of roots.	Loss of weight per hour.	Aggregate percentage loss.	Aggregate percentage loss.	Loss of weight per hour.	Weight of roots.
	57.55	...	...	...	...	60.85
1	38.6	18.95	32.92	40.76	24.75	36.1
2	16.2	22.4	71.85	74.85	20.8	15.3
3	11.2	5.0	80.53	84.55	5.9	9.4
4	8.85	2.35	84.62	84.96	0.25	9.15
5	8.65	0.2	84.96	85.04	0.05	9.1
6	8.6	0.05	85.05	85.12	0.05	9.05
7	8.55	0.05	85.14	85.16	0.02	9.03
8	8.52	0.03	85.19	85.17	0.01	9.02
9	8.5	0.02	85.23	85.17	0.00	9.02
10	8.48	0.04	85.26	...	...	...
11	8.48	0.00	85.26	...	...	...

Drying at 80°

Length of exposure in hours.	Longitudinal Sections.			Cross Sections.		
	Weight of roots.	Loss of weight per hour.	Aggregate percentage loss.	Aggregate percentage loss.	Loss of weight per hour.	Weight of roots.
	57.15	...	...	...	...	53.5
1	28.6	28.55	49.56	49.43	26.45	27.05
2	12.5	16.1	78.12	89.3	16.85	10.2
3	7.8	4.7	86.35	86.72	3.1	7.1
4	7.7	0.1	86.52	86.91	0.1	7.0
5	7.6	0.1	86.7	87.0	0.05	6.95
6	7.57	0.03	86.75	87.1	0.05	6.9
7	7.56	0.01	86.77	87.1	0.00	6.9
8	7.55	0.01	86.78	...	...	...
9	7.55	0.00	86.78	...	...	...

Drying at 90°

Length of exposure in hours.	Longtitudinal Sections.			Cross Sections.		
	Weight of roots.	Loss of weight per hour.	Aggregate percentage loss.	Aggregate percentage loss.	Loss of weight per hour.	Weight of roots.
	58.3	...	...	...	...	64.3
1	29.15	29.15	50.0	55.28	35.55	28.75
2	10.1	19.05	82.67	48.91	17.05	9.7
3	9.9	0.2	83.01	85.07	0.1	9.6
4	9.85	0.05	83.1	85.14	0.05	9.55
5	8.77	0.08	84.95	85.24	0.05	9.5
6	8.7	0.07	85.06	85.24	0.00	9.5
7	8.67	0.03	85.12	...	...	...
8	8.67	0.00	85.12	...	...	...

It becomes apparent from the results tabulated that the cross sections lose their moisture in less time than do the conventional longitudinal sections. Inasmuch as the cross sections afford a better appearing drug, it would seem best to discard the customary longitudinal cutting for the purpose of curing this drug.

Another point worth calling attention to is this, namely, that whereas the roots harvested in fall lost 72+ percent of moisture those harvested the next spring lost 85+ percent. Additional experiments will be necessary to show whether this is due to loss in carbohydrate content during the winter or to water absorption.

It has already been stated that earlier experiments have revealed the desirability of drying the roots at 70°. The three series of experiments with the roots collected in spring show again that little or nothing appears to be gained by higher temperatures, whereas the drug may suffer in appearance because of what may be called caramelization, for want of a better term. In this connection, attention should again be directed to the fact that the thermal death point of the oxidase contained in the root lies not much above 70°, hence danger from causing the root to become discolored because of action of oxidase on so-called chromogen is practically averted at this temperature.

That the darkening of the root due to exposure is brought about by an oxidase can readily be demonstrated by testing the fresh cross section of the root with tincture of guaiac. This reagent is colored a deep blue by the oxidase, whereas the corresponding parts of the root are colored brown by exposure to air.