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Chemical Studies of Oregon Fruits.

Points on Prune Dipping.

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POINTS ON PRUNE DIPPING.

It is an almost universal custom among horticulturists in this state to dip prunes, particularly Petites and Italians, into a boiling solution of lye just previous to drying, primarily for the purpose of hastening the operation of drying, and secondarily, as claimed by many, for the purpose of cleansing and rendering the skin less tough.

Bulletin 45 of this station says concerning this process: "Lye dipping as practiced in Oregon is about as follows: One pound of concentrated lye is dissolved in from 10 to 50 gallons of water, the proportion of lye and water differing greatly with the various prune growers. The primitive way is to keep the solution boiling in a large kettle, into which the prunes, placed in a wire basket or a much perforated metal vessel, are immersed and there kept in motion, by twirling or swinging for from 30 to 60 seconds, depending upon the condition of the fruit. The more modern way is to have the fruit run from the grader to a set of endless chains with carrying aprons and by them carried through a pan containing the boiling lye solution, heated with submerged steam pipes; from the lye the prunes are carried on through fresh water, preferably running water, and then spread on trays.

If the operation is well done the prunes should have their skins bright and shining, and present on close examination a finely checked condition. Over or under immersion causes the fruit to dry unevenly; when too much scalded the skin tears and becomes ragged and the fruit becomes soft and mushy, making a sticky, nasty mess on the tray."

The pricking method used in California to accomplish the same result is not practiced to any extent in Oregon, although a few machines are to be found in the state.

From the above it would appear that a vast difference exists in the strength of solutions used for dipping. It was to learn something of the conditions affecting this process that some experiments were undertaken in the fall of 1896. In the summer of 1898 these were extended further in order to ascertain something as to the

relative strength of the commercial concentrated lyes on the market. This latter phase of the work was added because inquiries were being asked as to the relative merits of the various brands, and from the further fact that many complaints were heard from those using the article, both for the purpose indicated and as an ingredient of sprays, that a wide difference existed in the strength of the various brands, based on the fact that all brands do not give equally good results when used in like manner.

The maximum strength for the dipping solution in use would give a lye solution of 1.25 per cent alkalinity, provided the lye used was 100 per cent pure and the minimum strength a .25 per cent solution. An analysis of one sample of dipping solution taken from a tank showed .83 per cent alkalinity as soda. There appears to be a great difference in the strength of the lyes for sale on the market, and the more observant operators have found that it is unsafe to fix any quantity of lye as measured by the number of cans of the ordinary size, but that the correct strength of the lye must be judged by the appearance of the fruit coming from the solution. A confessed fault of lye dipping is the unevenness with which the fruit dries after being dipped, and particularly is this heard from those who are not in the habit of thoroughly grading their fresh fruit. Some experiments have been conducted which I think will throw some light on this question. Prunes of normal size were subjected to treatment in a 1.25 per cent solution of lye for 20 seconds, and on removal from the solution were found to be well checked, but small prunes were very imperfectly checked, *many of them not being affected at all*. Increasing the time seemed only to cause the prune to crack deeply or the skin to roll up leaving the flesh badly exposed. A trial with a solution of double the strength used at first, 2.5 per cent alkalinity, only caused the skin to roll up worse and the cracks to be made deeper, and failed to produce a well checked fruit. It is well to say that the weaker solution is probably somewhat stronger than that used by most horticulturists, inasmuch as the lyes used are very variable, and the strength used in this experiment would only be obtained by using the strongest solution customary to use in this state, and on the condition that the lye used be 100 per cent pure, which is not usually the case. A practical application of these results is to enforce the idea of preliminary grading of fruit, or, still better, the necessity of keeping trees in such healthy condition as will permit them to bear only fruit of normal size. Particular care

should be taken not to allow them to overbear, which will always cause them to produce a stunted fruit which will result in the production of a large proportion of "frogs."*

It is impossible to lay down any formula to be rigidly followed for the making of a solution for dipping under the present condition of the market. The various brands of lye are of such variable strength as to make this practically impossible.

Concentrated Lye is a commercial term used to express a mixture of carbonates and hydroxids of potash or soda together with more or less impurity. It does not refer to a fixed chemical compound as a rule, hence the term may cover a multitude of evils.

While it does not make any great difference whether a soda or potash lye be used in the line of work in which it is employed by the horticulturist, yet the potash lyes are probably slightly preferable inasmuch as they form more soluble compounds in the case of sprays and are more easily removed from dipped fruit. In general I believe the potash lyes should be used in preference to the soda lyes. The most important point to be considered by the horticulturist is the quantity of actual alkali obtained at a stated price.

It was to obtain some information on this point, to enable us to have an idea of the quality of the various brands, that analyses of the brands found at several points in the state were made during the summer of 1898. The results of these analyses are set forth in the table which follows. The total alkalinity, for the sake of convenience in each case, is calculated as soda.

These lyes were purchased in the open market at the price indicated in the table and are brands which might be purchased by horticulturists.

* BULLETIN 114, CAL. EXPT. STATION.

TABLE SHOWING RELATIVE STRENGTH OF CONCENTRATED LYES TO BE FOUND IN OREGON MARKET, 1898,

Laboratory number.	Where purchased.	Brand.	Net weight of contents.		Price Per can	Per cent of alkali- nity (as soda).	Actual alkali per can oz.	Actual alkali for 10c. oz.
			Grams	Ounces				
1373	Corvallis, Oregon	Acme	565.8	19.9	.10	28.2	5.61	5.61
1374	Corvallis, Oregon	Babbitt's Concentrated	435.1	15.3	.10	75.2	11.50	11.50
1375	Corvallis, Oregon	Red Seal	355.9	12.5	.15	75.0	9.38	6.25
1376	Corvallis, Oregon	Babbitt's Concentrated	403.3	14.2	.10	75.5	10.72	10.72
1377	Medford, Oregon	Keystone	303.3	10.7	.10	9.3	.99	.99
1378	Medford, Oregon	Favorite	190.0	6.7	.05	33.5	2.14	4.18
1379	Medford, Oregon	Lewis' Lye	342.9	12.1	.10	50.6	6.12	6.12
1380	Medford, Oregon	Acme	470.9	13.1	.10	26.9	3.43	3.43
1381	Medford, Oregon	Babbitt's Concentrated	424.0	15.0	.10	69.4	10.42	10.42
1382	Medford, Oregon	American Concentrated	410.6	14.4	.10	63.0	9.07	9.07
1383	Salem, Oregon	Quaker City	208.3	7.0	.05	74.1	5.41	10.82
1384	Salem, Oregon	Red seal	360.2	12.8	.15	78.3	10.02	6.68
1385	Salem, Oregon	Giant Powdered Lye	599.7	21.2	.10	69.6	14.75	14.75
1386	Salem, Oregon	Pittsburgh Concentrated	271.6	9.5	.05	26.8	2.55	5.10
1387	Salem, Oregon	Eagle High Test	291.5	10.3	.12½	73.3	7.55	6.04
1388	Salem, Oregon	Champion	345.2	12.2	.12½	62.4	7.61	4.99
1389	Salem, Oregon	Ivory	457.1	16.1	.10	34.1	5.49	5.42
1390	Salem, Oregon	Giant Potash	482.0	17.0	.10	59.1	10.04	16.04
1391	Salem, Oregon	Lewis' Lye	369.8	13.0	.10	71.9	9.34	9.34
1392	Salem, Oregon	Eagle High Test	356.7	12.6	.10	70.2	8.85	8.85
1393	Salem, Oregon	Old Country Wood Ash	373.5	13.2	.10	75.2	9.91	9.91
1489	La Grande, Oregon	Babbitt's Concentrated	408.1	14.4	.10	74.8	10.67	10.67
1490	La Grande, Oregon	Quaker City	184.9	6.5	.05	77.1	5.00	10.00
1491	La Grande, Oregon	Tomson's Lye	404.7	14.3	.10	34.1	4.88	4.88
1492	La Grande, Oregon	Red seal	358.7	12.6	.15	77.1	9.71	6.48
1493	La Grande, Oregon	American	444.4	15.6	.10	70.4	10.98	10.98
1494	La Grande, Oregon	Rising Sun	350.6	12.3	.10	57.2	7.04	7.04

- No. 1373. "Acme High Test Granulated Lye or Potash. Packed by the Acme White Lead and Works, Detroit, Mich."
1374. "B. T. Babbitt's Pure Concentrated Lye, double strength, of Common Potash. New York."
1375. "Red Seal Granulated Lye, Manufactured by P. C. Tomson & Co., Philadelphia, Pa."
1376. Same as 1374.
1377. "Keystone Concentrated Lye Works, Philadelphia, Pa."
1378. "Favorite High Test Granulated Lye, Manufactured by Phila. Lye and Chemical Co., Ltd., 2200 South Tenth St., Phila., Pa."
1379. "Lewis' Lye. Patented. Highly Perfumed, Powdered, 98 per cent. Our Motto: Full weight, full measure, full strength. This can contains 12 oz. George T. Lewis & Menzies Co., Penn'a Salt M'fg Co., Gen'l Agents, Philad'a."
1380. Same as 1373.
1381. Same as 1374.
1382. "American Concentrated Lye. Warranted Pure. Manufactured by George T. Lewis & Menzies Co., Proprietors of American Lye Company, Philadelphia."
1383. "Quaker City Granulated Lye, High Test. P. C. Tomson & Co., Manufacturers, Philadelphia."
1384. Same as 1375.
1385. "100% Standard Giant High Test Powdered Lye. Manufactured by A. Mendleson & Sons, Albany, N. Y."
1386. "Concentrated Lye. The Housekeepers' Friend. Manufactured by Pittsburgh Lye Co."
1387. "Eagle High Test Perfumed and Powdered Lye. Eagle Lye Works, Milwaukee, Wis."
1388. "Champion Perfumed 98% Pure Powdered Lye. Champion Chemical Works, Chicago."
1389. "100% Ivory High Test Powdered and Perfumed Lye or Potash. Philadelphia Lye & Chemical Co., Limited, Philadelphia."
1390. Same as 1385.
1391. Same as 1379.
1392. Same as 1387.
1393. "Old County 'Wood Ash,' High Test Powdered Lye. P. C. Tomson & Co., Manfr's, Philadelphia, Pa."
1489. Same as 1374.
1490. Same as 1383.
1491. "P. C. Tomson's Pure Caustic Lye. P. C. Tomson & Co., Philadelphia."
1492. Same as 1375.
1493. Same as 1382.
1494. "High Test Powdered Rising Sun Lye. Geo. Dee & Son, Dubuque, Ia."

An examination of this table shows the complaints of horticulturists, that there is a great difference in the strength of the lyes on

the market, to have good found. It further shows that there is no regular standard of weight for the contents of the cans, although the cans ordinarily offered for sale at ten cents probably are intended to be offered as one pound cans. Of such cans there appears to be but four which net one pound of lye, some falling short nearly six ounces, or 37 per cent. Of the four which net one pound for the contents two are notably deficient in alkalinity as measured by the best obtainable commercial lye.

The actual alkali purchased for ten cents will be seen in the last column of the table. It varied from a little less than one ounce in the case of 1377 to 14.75 ounces in 1385. There is in any such crude commercial product as here discussed considerable variation which would be allowable, but the variation should be within relatively small limits.

Inquiry among horticulturists shows that the two brands most commonly used here are Babbitt's and Red Seal, the former selling for ten cents and the latter for fifteen. A study of the above table will give an idea as to the relative merits of not only these two brands, but also of these as compared with the others. So far as cheapness and quality are concerned there appears to be little choice between Babbitt's, American, Giant, and Quaker City (using two cans of the last named to each of the other brands, which of course is an objection).

CONCLUSION.

1. The smaller sizes of prunes are not easily affected by the ordinary process of lye dipping.
2. That increasing the strength of the lye solution does not bring about a proper checking of these small prunes but merely causes them to crack deep into the flesh or the skin to roll up leaving the flesh badly exposed.
3. To obtain a uniform product of dried prunes care should be taken that trees do not overbear and thus produce an abnormally small prune with a tough skin which will not check.
4. Prunes should be thoroughly graded before drying so the smallest sizes may be removed and either subjected to some other treatment than lye dipping—possibly pricked if they are to be dried—or used to make secondary fruit products.
5. The net weight of most brands of concentrated lye to be found on the market is considerably short of one pound, and the total alkalinity is quite variable among the different brands.
6. The most economical brands offered for sale in Oregon at the time these samples were collected were Babbitt's, American, Giant, Quaker City.