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*Nutritive Values
of Native Foods of
Warm Springs Indians*



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The project was a cooperative venture developed by the Oregon State University Extension Service and the Department of Home Economics Research to meet the long-standing obvious need to determine the nutrient composition of native Indian foods.

The home economics Extension agent coordinated the project at the Reservation, and the nutritional analyses were done at Oregon State University by the Department of Foods and Nutrition, School of Home Economics, and by the departments of Home Economics Research and Agricultural Chemistry of the Oregon Agricultural Experiment Station.

For botanical nomenclature and taxonomic classification we referred to Morton E. Pecks' "A Manual of the Higher Plants of Oregon," 2nd edition, 1961 (Binford and Mort, Portland, Oregon). This book is out of print but may be found in most libraries. Appreciation for advice and help goes to Kenton L. Chambers, professor of botany and curator of the Herbarium at Oregon State University.

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Nutritive Values of Native Foods of Warm Springs Indians

Native foods, including wild roots, fruits, stems, and leaves, as well as, fish and game, still form an important part of the cultural life of American Indians. Roots are dug from early spring through late summer. Fruits, especially huckleberries, are harvested summer and fall. Hunting and fishing occur year round. The foods are eaten fresh, but also large amounts are preserved by canning, freezing, and drying. Increased use of refined and commercial foods, as well as greater difficulty encountered in obtaining native wild foods, have meant a decrease in their use. They are still highly prized, however, and are a significant part of the many special Indian festivals and rituals. Where available they may be consumed in considerable quantity as part of the regular Indian diet.

Annually the Warm Springs Indians observe two religious feasts of Thanksgiving based on important native foods—the Root Feast in the spring (April) and the Huckleberry Feast in early fall (late August and early September).

Questions have been raised from time to time regarding the nutritive value of these native foods. Now some of this information is available as a result of a cooperative study between the Confederated Tribes at the Warm Springs Reservation and Oregon State University. It is hoped that the nutrient values presented in this publication will be helpful to the Indians and organizations working with them. In some instances these native foods may make significant nutrient contributions to the diet. However, their value is very much influenced by the preparation or preservation treatment they have received. The information on nutritive content should provide additional knowledge for the incorporation of native foods into special diets by hospitals or private individuals where the psychological benefit of familiar, cherished foods can be considerable, particularly for the older generation unaccustomed to non-native foods.

Moreover, renewed interest in a “return to the land” philosophy and the use of “natural” foods suggests that the information on preparation and nutritive value of these native foods may have even wider

general interest for Oregonians and residents of the Northwest.

A table of some of the significant nutrient values appears at the end of this booklet. The difficulty en-



Gathering roots for the "Root Festival" and also for this study at Warm Springs Reservation



Use of the "Capun" (digging stick) in root gathering at Warm Springs

countered in obtaining representative volumes in household measures on some of these products necessitates calculations on the basis of weight if they are to be used with any degree of accuracy in calculating therapeutic diets such as those for the diabetic. The roots in particular vary considerably in size so that it must be emphasized that the household measures given in the table are for these samples only and are therefore approximate.

**BLUE CAMAS (*Camassia quamash* (Pursh)
Greene), Warm Springs, "Wa -ka-mo,"
pronounced Wä'-kă-mō**



Camas grows in damp places and the blue blossoms must be observed at the time they bloom in order to avoid selecting the deadly white or green flowering camas. They are harvested later at the seed pod stage shown in the photograph (above). They are peeled and may be eaten fresh, or dried in

the sun for year round use. Often they are subjected to a "so-called" barbecue treatment. This consists of cooking them buried in a pit for about a day. Flavor is developed according to the kind of firewood and seasonings used. The bulbs are placed on heated flat stones in a fire pit and covered with skunk cabbage leaves followed by fresh pine needles. A fire is built on the surface and maintained for two to three days. After this treatment the bulbs are black in color and may be eaten as they are or baked with salmon. Frequently dried camas is cooked with dried couch. One cup of fresh camas provides about one-tenth the Recommended Dietary Allowance* of vitamin C, but this vitamin is destroyed in the drying or barbecuing processes.

Camas appears to be a good source of iron, although iron from plant sources is not always available to the body. One cup provides a little better than half the Recommended Dietary Allowance for men or one-third the allowance for women.

BITTER ROOT, (*Lewisia rediviva* Pursh), Warm Springs, "Pe ah ke," pronounced pā-ā'-kē



Bitter root, also known on the reservation as macaroni root, is the most popular root. It is considered very valuable as trading or "swapping" material. The plant grows in dry, rocky places and has a

* Food and Nutrition Board, National Research Council, Recommended Dietary Allowances, 9th rev. ed., 1979, National Academy of Sciences, Washington, D.C.

beautiful pink blossom but is dug before the blossom opens. The leaves are green and succulent at the top of a carrot shaped root that is covered with a thin, brown skin which is easily removed in boiling water. The roots are always peeled since it is this outer coating that contains most of the bitterness. Bitter root may be used fresh, or preserved as a frozen or dried product. It is usually preserved by drying on screen trays in the sun for four warm days. The trays are taken inside at night. Dried roots are then stored in plastic containers with tight lids to avoid weevil infestation. Bitter root may be cooked in water like potatoes, then seasoned with butter and salt, or most frequently it is prepared in combination with salmon—fresh, frozen, canned, or dried. At the annual Root Feast, fresh bitter root seasoned with salmon is a very important dish. Fresh bitter root is a good source of vitamin C, one cup providing about two-thirds of the Recommended Dietary Allowance for this nutrient. The frozen product retains this value for awhile, but after a few months of storage the vitamin C content has decreased drastically and approximates that of the dried product, (about one-third the amount that was originally present). However, the amount of vitamin C retained is still enough to make a significant contribution to the diet.

“WILD CELERY” (*Lomatium nudicaule* (Pursh) Coult. & Rose) Warm Springs, “cum-see,” pronounced cōm-sē’ which refers to the stalk



“Wild celery” is not preserved in any way. The stem is eaten fresh as long as the season lasts, April through June. “P-tish, P-tish” is the little green leaf

that first pushes through the ground and is considered a delicacy. By the time the stalk, which is the main edible portion, is ready for use the leaves have become tough and tasteless. With the fully grown stalks, leaves are removed and any hard portion from the root end is pinched off with fingers or teeth. The thin but stringy skin of the stalk is pulled back from the root toward the flower end as shown in the photograph so that the strings will be dangling down over the blossoms. Then the blossom and skins are discarded and the celery is ready to eat. In the young plant, the vitamin C value is remarkably high, one cup providing more than the adult Recommended Dietary Allowance.

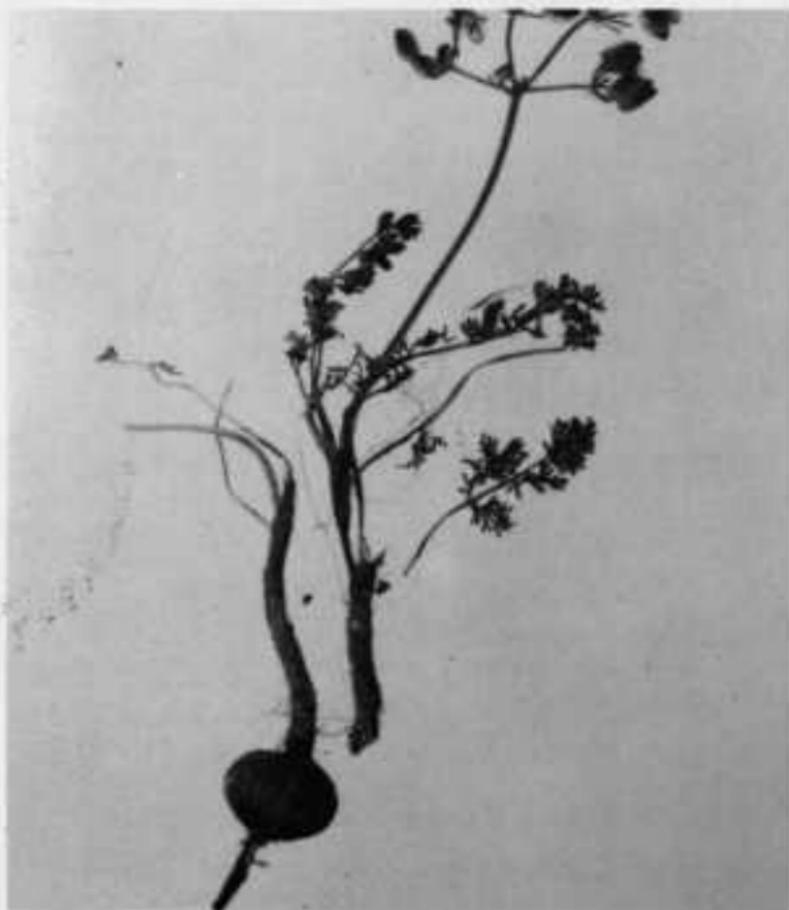
BISCUIT ROOT, also Bread Root (*Lomatium cous* (Wats.) Coult. & Rose) Indian name "Coush" or "Cous," pronounced Kă-'ōos



"Coush," a variety of biscuit root, grows on dry, rocky hillsides and flats. It ripens in April and is dug

after the seeds are formed, at which time it is easy to peel. It is cooked fresh as a vegetable or it may be dried whole by the same procedure as for bitter root. It may be ground, usually in a food chopper, and then spread out for drying. The small dry pellets are stirred into hot liquids (soups or meat broths) and serve as a slight thickening like potatoes or meal. In this ground form it is more readily usable than when dried whole. However, hunters like to slip a handful of the whole dried root in their pockets for snacks. Like "luksh," dried "coush" is often cooked with salmon for seasoning. It is also cooked with camas and a small amount of sugar. Nutritionally a one-cup serving of fresh coush provides about one-third of the Recommended Dietary Allowance of vitamin C. The value decreases in the frozen product over long periods of storage and is lost completely so far as the dried product is concerned. Coush contains amounts of iron that may make significant contributions to the diet. One cup provides about one-third the Recommended Dietary Allowance for a man and about one-fifth the allowance for a woman.

CANBY'S DESERT PARSLEY (*Lomatium canbyi* Coult. & Rose) Indian "Luksh," pronounced lōksh



The luksh variety of biscuit root belongs to the parsley family as does coush (cous) and grows in the same places. It too is dug after the seeds are formed. It may be cooked fresh as a vegetable or dried after peeling. The roots are spread out to dry, usually in the sun, and then stored in cedar root baskets. The dried product may be cooked whole or it may be pounded into a meal which is used in various ways, such as in the preparation of a mush or pudding. Luksh may be peeled, ground immediately, and while still moist formed into small patties which are pressed with the thumb or three fingers that show as prints in the little cakes. These are then dried in the sun and known as "three-finger" or "palm" cakes, *luksh-me*. The illustration shows palm cakes made from luksh or from saw-wickt. Occasionally some salt and sugar are added to the mixture. The cakes are used for "snack items" and are very popular with hunters. The vitamin C content of fresh or frozen luksh is higher than that of "coush." A one-cup serving provides about half the Recommended Dietary Allowance for vitamin C. However the dried products have lost all their vitamin C value.

"LUKSH-ME" AND "SAW-WICKT-ME"
(dried patties made of Luksh or of Saw-wickt)



INDIAN CARROT or **FALSE CARAWAY** (*Perideridia gairdneri* (H. & A.) Mathias) Indian Saw-wictk, Umatillas call it Sā-hwēt'; Utes call it yam'-pä.



This root, known as “wild carrot” on the reservation, is washed and put through a food chopper with skin intact. Using thumb and three fingers the pulp is shaped into the “three-finger” or “palm” cakes similar to those previously discussed for luksh. In this case the cakes are called “saw-wictk-me.” If the pulp is dry, a little water is added for shaping. These cakes are then placed on mats made of dried cattail stems connected with twine or on clean cloths to dry. They are placed in the hot sun and turned daily so that they will dry evenly and thoroughly, then stored in air-tight cans. Before the day of the food chopper or grinder, the roots were beaten into a pulp with stone mortar and pestle. This root grows in the same places as camas. “Wild carrot” also can be eaten raw or cooked as a vegetable when fresh.

The carotene (provitamin A) content of Indian carrots is considerably less than that of true cultivated carrots, but it would make a contribution to the requirement for this vitamin. The amount of iron present is high, one cup containing about one-half the Recommended Dietary Allowance for men or one-third the allowance for women, but again availability of iron from plant sources is variable. Vitamin C is present in similar proportions to the other roots, one cup providing between one-third and one-half the adult Recommended Dietary Allowance in the fresh product with a decline to almost zero in the dried cakes.

FIELD MINT (*Mentha arvensis* L.)
Indian "Shu-ka, Shu-ka"



Known on the reservation as "wild tea," this plant grows in swampy areas. Both the stems and leaves are collected and usually dried. However, sometimes the fresh green leaves are used without drying by steeping in hot water for a tea which many relish when served with sugar.

CHOKECHERRIES (*Prunus demissa* (Nutt.)
Walp.). Warm Springs "T-mish" (cherries)
Washoe "Tsam-chit" (cherries)



Chokecherries are used fresh in season during August but to an even greater extent are preserved for later use. They may be canned whole, or the juice extracted for jelly-making. The fruit is probably most often preserved by drying either whole or after pounding and grinding into a pulp that includes the cracked seeds. The pulp is made into patties and dried for storage. These may be eaten as snacks—seeds and all—or the patty may be cooked in water as are other dried fruits. Whether or not the cracked seeds are eaten varies according to family custom. When ripe the vitamin C content of the fruit is 50 percent greater than that of cultivated cherries. Therefore one cup of fresh chokecherries provides about one-third of the recommended adult allowance for vitamin C. The amount available after preservation may be considerably less because vitamin C is rapidly destroyed upon exposure to heat and air.

BLUE HUCKLEBERRIES (*Vaccinium* species),
Indian "We woo no Wash," pronounced Wá-wē-nō-
Wash

Huckleberries have a special place in the rituals and festivals of the Warm Springs Tribes but are also important as a fairly regular part of the diet. In season (July-October) they are eaten fresh. There is an annual Huckleberry Feast when the berries ripen. They are canned, frozen, sun-dried, or barbecued for use during the rest of the year. In these forms,

they may be eaten as they are or in pies and jelly. A favorite traditional Indian way to serve huckleberries throughout the year is the canned berry in all its juice, no sugar added, eaten with the main meal. Nutritionally the fresh or frozen product makes a significant contribution of vitamin C, a one-cup serving providing almost half the Recommended Dietary Allowance for an adult.

**BLACK LICHEN (*Alectoria* species),
Indian "Koonts," pronounced Kōnch**



On the reservation black lichen is called "koonts," which means hair. Hairiness is the characteristic which distinguishes the black lichen from the other lichens with which it may be associated. It grows on fir, pine, and juniper trees. After it has been gathered it is brought home in burlap sacks and carefully hand cleaned to remove all foreign material. The "koonts" is then soaked in water during which time it collapses and becomes less bulky. Rocks are placed in the bottom of a round barbecue pit about two feet deep and heated by a fire. Green pine boughs are placed over the rocks, then dry pine needles, fol-

lowed by the soaked lichen in a clean burlap sack. Over the sack of lichen is placed another layer of dry pine needles and green boughs, then a wet sack, and finally a covering of soil, with a small opening left in the top through which water is added. After sealing the pit, the lichen is left to cook for 12 hours. The large flat bar of "koonts" that comes from the pit is cooled and then cut into smaller bars that may be stored in the freezer, or ground and dried. "Koonts" is cooked in water, then a little flour, sugar, and sometimes raisins are added to make a pudding that is used as a dessert. The vitamin value is largely lost during the lengthy heat treatment but the iron content is high (see footnote to table, page 23).

Barbecued BLACK LICHEN or "Koonts"



PACIFIC LAMPREY



Commonly referred to as eels on the reservation, this Indian delicacy is the Pacific Lamprey which is used extensively in season. To prepare fresh they are stretched out on sticks to roast before an open fire. To preserve them for future use, they are dried

stretched out on sticks. A problem encountered in storage of the dried product is the very high oil content. They have a tendency to become rancid over extended storage periods at room temperature. The term used by the Indians to describe this rancidity is "rusty," as they do become rust colored. This condition has not been much of a problem since the advent of freezers on the reservation for storage of the dried product.

FISH

All kinds of salmon and the steelhead trout are used fresh or preserved in some manner. Since spring salmon are quite rich, they are usually preserved by canning or salting. Salt curing is used less since the advent of freezer storage. Fall salmon are dried for winter use and late fall salmon, often called white fish, are usually smoked to add flavor. They are of a much lower quality than earlier runs of salmon since after spawning they have lost their fat content and tend to be rather tasteless. Preparation of the salmon for drying or smoking is similar. After dressing, the fish is cut into strips and hung over horizontal poles. If sun dried, chicken netting enclosures may be necessary to protect the fish from pests. Preferred fuel for the smoking fires is green or damp fruitwood such as wild cherry or apple. When preparing dried or smoked fish for eating, the skins may be cooked separately in a large amount of water until tender. The skin is then used to flavor cooked potatoes or roots. The dried fish frequently is eaten for between-meal snacks. The dried fish also may be cooked with roots or potatoes or it may be cooked separately.

VENISON JERKY

Venison is dried or smoked using similar methods to those described for drying and smoking salmon.

CONCLUSION

It is hoped that this information on native foods will prove interesting and useful to many individuals. It should be recognized that these food samples are only representative, and that there are numerous other wild foods used by the Indians. Hopefully, future studies will provide knowledge of the nutritive value of additional species. While these foods were gathered primarily from eastern Oregon and southeastern Washington, it is felt that the nutritional values found may have broader implications, in that they would be similar for related species in different parts of the country.

NUTRITIVE VALUE^a OF SOME NATIVE FOODS OF THE WARM SPRINGS INDIANS100 grams Edible Portion^b

FOOD	Water (%)	Energy Value (Kilo calories)	Protein (gm)	Carbohydrate		Calcium (mg)	Iron ^b (mg)	Magnesium (mg)	Zinc (mg)	Thiamin (mg)	Riboflavin (mg)	Ascorbic Acid (mg)	
				Fat (gm)	Total (gm)								Fiber (gm)
BITTER ROOT													
Dried01	.05	8	
Fresh ^c	76.6	90	.7	.1	21.6	1.5	18.7	1.4	2.9	.7	.09	.02	27
Frozen	75.6	94	.9	.2	22.1	1.3	22.0	1.6	3.1	.7	.09	.03	17
Frozen, extended storage	75.6									.11	.05	9	
COUSH													
Dried		387	2.5	1.2	91.6	7.9	70.0	2.3	10.0	2.5	.12	.10	8
Fresh	67.1	127	1.0	.4	30.0	2.6	79.0	3.6	57.2	.79	.06	.07	17
Frozen, extended storage05	.11	7	
Boiled03	.17	4	
LUKSH													
Dried cakes	10.8		2.1									.19	
Fresh	71.9	108	.8	.12	25.9	2.2	47.7	1.5	6.0	.5	.11	.06	20
Frozen	65.4	136	.4	.71	32.0	1.4	27.7	.9	3.8	.97	.09	.03	20
Frozen, extended storage03			16

CAMAS													
Barbecued, fresh	71.4										.04	.40	
Barbecued, sugared and frozen	71.4	108	3.4	.35	23.0	2.7	68.6	4.9	2.7	1.2			
Fresh	70.0	113	.7	.23	27.1	1.3					.07	.05	4
Cooked													4
"WILD CARROTS"													
Dried cakes ^d							130.0	10.8	141.0	2.1	.17	.34	3
Fresh	64.1						32.3	7.9	42.4	.72	.05	.08	23
BLACK LICHEN—KOONTS													
Fresh							250.0	20.5	4.5	3.6	.05	.63	9
Barbecued	75.9						48.2	8.3	19.2	11.4	.03	.11	
"WILD CELERY"													
Young growth	87.8						36.6	.7	22.3	.39	.02	.08	66
Mature growth													17
SWEET CORN													
Dried		412	9.5	4.5	83.6	2.1					.02	.03	Trace
MINT													
Dried84	28
Fresh	81.8						67.3	7.2	88.4	1.2	.04	.12	15
HUCKLEBERRIES													
Fresh03	.12	12
Frozen, extended storage02	.02	23
Canned01	.08	5
CHOCHECHERRIES													
Dried05	.71	
Ripe, fresh02	.3	11

FOOD	100 grams Edible Portion ^a												
	Water (%)	Energy Value (Kilo calories)	Protein (gm)	Fat (gm)	Carbohydrate		Calcium (mg)	Iron ^b (mg)	Magnesium (mg)	Zinc (mg)	Thiamin (mg)	Riboflavin (mg)	Ascorbic Acid (mg)
					Total (gm)	Fiber (gm)							
WILD CHERRIES													
Canned01	.15	5
SALMON													
Dried	413	64.9	10.6	14.5	1.1	1400	2.5						
Dried & Smoked	416	53.4	12.8	21.8	1.0	2250	4.5						
Red, smoked			44.2								.15	.09	
PACIFIC LAMPREY													
Dried			22.6								.47	2.7	
VENISON													
Jerky			63.7								.60	1.5	

a) *Approximate Household Equivalencies:*

1. Camas—freshly barbecued moist 1 cup \cong 150 gm \cong 14 roots, assorted sizes
2. Bitter root—fresh or frozen 1 cup \cong 120 gm, dried 1 cup \cong 100 gm
3. Cough—fresh or frozen 1 cup \cong 290 gm, dried 1 cup \cong 100 gm
4. Luksh—fresh or frozen 1 cup \cong 130 gm \cong 23 roots assorted sizes; 15 dried palm cakes \cong 50 gm
5. "Wild Carrot"—fresh 1 cup \cong 100 gm, 12 dried palm cakes \cong 70 gm \cong 1 cup
6. "Wild Celery"—1 cup \cong 100 gm
7. Koonts—fresh 1 cup \cong 6.3 gm, barbecued bar 5"x2"x1½" \cong 9 oz.
8. Huckleberries—fresh or frozen 1 cup \cong 130 gm, canned (drained) 1 cup \cong 180 gm
9. Chokecherries—fresh 1 cup \cong 160 gm

b) Iron in plants may be less available to the body than that in animal foods.

c) The samples designated fresh were analyzed within 24 hours; samples designated frozen were analyzed after 10 days freezer storage; some samples had been subjected to extended freezer storage of several months.

d) β -carotene content of dried carrot cakes was 2300 I.U. per 100 gm. However, only one-sixth of the β -carotene is available to the body as vitamin A.

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