



Bulletin

No. 10.

A Brief Explanation on the Contents of Our Publications

Hokkaido Experiment Station of the
Imperial Forestry and Estates Bureau

Toyohira, Sapporo

Oct. 1946

Contents

Reports	Page
No. 1. Sunlight in relation to tree growth and some important factors concerning the methods of control in forest planting.	5
Bulletins	
No. 1.	
(1) On sifting the seeds of the important forest trees in Hokkaido. 1st Report. Sifting the seeds of Todo-fir.	6
(2) On the result of preservation of the seeds of Todo-fir and Yezo-spruce. 1st Report.	6
(3) The effect of growth-promoting hormone preparations upon forest trees.	7
No. 2.	
(1) Control of the snow-molding in the nursery stocks of Yezo-spruces.	7
(2) Damage caused by Yezo-spruce gall <i>Adelges</i>	8
(3) On the mechanical control of the Yezo-spruce gall <i>Adelges</i>	8
(4) The gall <i>Adelges</i> on Yezo-spruce.	8
(5) The <i>Prociphilus</i> on the root of Todo-firs and Yezo-spruces.	9
No. 3. Injurious forest insects and their control.	9
No. 4.	
(1) On the theory of Met-ger.	10
(2) Contraction in the width of boards.	10

	Page
No. 5. Investigations on the naval stores in Hokkaido.	
(1) Collection of balsam from the blisters on the bark of Todo-firs.	11
(2) Collection of turpentines from black and red Yezo-spruces.	11
No. 6.	
(1) Mechanical properties of snows and its resistance against sleighs.	12
(2) A study on the working time of log transport in winter.	12
1) Log transport by horse and sleds.	13
No. 7. An interim report on the growth of forest trees of the foreign habitats (including different habitats of homeland).	13
(1) On the growth of Japanese Cryptomeria, kunugi (<i>Quercus serrata</i>) and Paulownia at Maruyama Park, Sapporo.	13
(2) Comparison of structures and increments of planted forests of Japanese cypress, Cryptomeria and Korean pine with those of Todo-fir at Niikappu Estate.	14
(3) Sylvicultural observation of Japanese red pine at Niikappu Estate.	14
No. 8. Illustration of the inedible mushrooms found in northern parts of Japan.	14
Pamphlets	
No. 1. Crop forecasting of the seeds of Todo-firs.	15
No. 2. Observations on the falling and germination	

	Page
of forest tree seeds.	15
No. 3. The hotbed nursing in the districts of high altitude and its effect.	16
No. 4. The density of snows at the thawing seasons.	16
No. 5. An universal seeds-sifting machine.	16
No. 6. Storing can and storehouse for the forest tree seeds.	17
No. 7. Working abilities of the forest laborers in felling and in log-making.	17
No. 8. Use of the Todo-fir needle-oil as a gasoline substitute.	18
No. 9. Management of forest machinery.	19
No. 10. General survey on the investigations of the year 1943.	20
No. 11. Diameter class gauges for small stems.	20
No. 12. The forest labors in Hokkaido.	20
No. 13. Forest products as a food supplement.	21
(1) Feeding experiments on live stocks with fodder containing wood-flour.	21
No. 14. The Greater East Asia War and the fuel problem in Japan.	21
No. 15. General survey on the vegetation in Manchuria, Mongolia and North China with special references to the distribution of forest plants.	22
No. 16. On the fruitage of beech-trees.	22
No. 17. Chemistry and production.	22
No. 18. Annual production of the branches and needles of Todo-firs and Yezo-spruces in Hokkaido.	23

	Page
No. 19. Preparation of the needle-oils.	23
No. 20. Content of essential oils in the twigs and needles of Todo-firs.	23
No. 21. Extraction of spring sap from maple-trees.	24
No. 22. Distillation process of the needle-oil with the modified HES-type apparatus.	24
No. 23. Preparation of resin soap.	25
No. 24. Studies on the woods resistant to shipworms.	25
No. 25. Delousing effect of the quassia extracts.	26
(1) The effect upon the <i>Anoflura</i>	26
(2) The effect upon the <i>Mallophaga</i>	26
No. 26. Practical methods of dyeing with plant extracts.	26
No. 27. On the deflexion of some of the more important woods in Hokkaido. Preliminary Report. Yezo- spruce, Todo-fir and basswood.	27
No. 28. A simple method of tea substitute making with plant leaves.	27
No. 29. Forest products as a food supplement.	28
(2) Feeding experiments on live stocks with fodder containing wood-flour.	28
No. 30. Use of lichens as an oil pad in shaft-boxes. ...	28
No. 31. Forest products as a food supplement.	29
(3) Feeding experiments on horse with fodder con- taining wood-flour.	29
No. 32. A modified lamp for the use of needle-o'ls. ...	30

Report No. 1.

Sunlight in relation to tree growth and some important factors concerning the methods of control in forest planting.

We planned to solve the questions on how much influence the sunlight has on the forest vegetations in Hokkaido, specially the influence of the sunlight under the crown of natural forests upon the germination of seeds, the development of plantlets and the growth of trees such as Todo-firs, Yezo-spruces and other chief forest plants. We also attempted to examine the optimum and minimum quantities of the sunlight for the plantlets of important forest trees in Hokkaido and to investigate on the other factors correlated with the sunlight. From these experimental results, we discussed the essential points in silvicultural treatments of the forests and forest trees.

From our experiments using many lattices, we found that the seedlings required for their good growth 67 % of all sunlight and more than 400 lux of brightness in one hour, and they could not grow under the light of 0.017 cal/cm² per minute. The minimum light requirement for all kinds of seedlings was about 1%.

If we want to obtain such sunlight in forests, we should try the group-cutting system. It was found

that, for this purpose, the cutting area must correspond from one-half to the full length of the tree height.

Bulletin No. 1.

(1) On sifting the seeds of the important forest trees in Hokkaido. 1st report. Sifting the seeds of Todo-fir.

In sifting the seeds of the Todo-fir, we studied the effective degrees of usual methods (sieve- and wind-selections) and decided to use the best sifting method after comparing various other methods which use water, petroleum or alcohol etc. We found the relationship between the locations of a cone or the sifting methods and the amount of sifted seeds in pure condition.

(2) On the result of preservation of the seeds of Todo-fir and Yezo-spruce. 1st report.

We tried many experiments for the methods of preserving the seeds of the Todo-fir and Yezo-spruce, and studied their results after a year. The experiments were performed in various preservatories—1) the artificial snow barrow built in the thawing seasons, where the seeds could be preserved in a low constant temperature, 2) the subterranean seed store, 3) the basement

of a building and 4) the store-hut—where the preserved seeds were treated with desiccatives or such agents which control the vitalities of the seed as corrosive sublimate, uspulun, mercuron, tannin-sap or heteroauxin.

(3) The effect of growth-promoting hormone preparations upon forest trees.

Experiments were performed on the effects of heteroauxin (β -indolyl-acetic acid), a growth-promoting hormone, upon the germination of seeds of Todo-fir, Yezo-spruce, red Yezo-spruce and larch. And the effects on the rooting of the slips of the Todo-fir, Yezo-spruce, poplar and mulberry-tree were also reported.

Bulletin No. 2.

(1) Control of the snow-molding in the nursery stocks of Yezo-spruces.

We examined the damage caused by snow-molding on the Yezo-spruce plantlets in the season of the thaw in Hokkaido, and found the influence of early or late thaw season on the damage. The preventive experiments were also performed with various fungicides and we recognized that the organic mercury compound and fungicide containing copper acted very effectively.

(2) **Damage caused by Yezo-spruce gall *Adelges*.**

We examined the damage of young Yezo-spruce plants caused by gall *Adelges* at Tomakomai, and investigated the circumstance between the size of the plants and the damage by the gall aphides, the effect of the damage upon the growth of plants, and the relation between the size of galls and the number of them.

(3) **On the mechanical control of the Yezo-spruce gall *Adelges*.**

To investigate the mechanical control of the Yezo-spruce gall *Adelges* as stated in the former report, we tried to remove all galls from the damaged plants by hand and studied them for two years. Then we found that the damage was decreased to 50% by removing off the galls, while the damage increased to 157% on the plants left as they were. And we could not notice any influence of this mechanical control for the growth of the plants in those two years.

(4) **The gall *Adelges* on Yezo-spruce.**

This is an entomological investigation about the three kinds of *Adelges* found on the Yezo-spruces in Hokkaido.

Oecological, biological and mechanical methods of

control are reported precisely. The chemical control is effective but it should be used only to some confined small forests.

(5) **The *Prociphilus* on the root of Todo-firs and Yezo-spruces.**

Two kinds of insects, *Prociphilus oriens* MORDWILKO and *P. kono* HORI, were found on the roots of Todo-firs and Yezo-spruces respectively.

Both insects have a peculiar habit of changing their hosts during the spring and summer seasons. In the spring they are found on deciduous trees, mainly *Fraxinus* and *Lonicera* respectively, but it is the conifers that suffer from severe damages. They have insect-enemies as well as favorers.

To guard against these parasitism the above mentioned deciduous trees must be kept away from the coniferous forests.

Bulletin No. 3.

Injurious forest insects and their control.

The contents are divided into two parts:

(1) General consideration and classification of injurious forest insects, their habits and the methods of their control—mechanical, chemical, biological, etc.

(2) All kinds of injurious insects found in each

kind of forest trees in Hokkaido are given with detailed descriptions and illustrations. Bulletin No. 4.

(1) On the theory of Metzger.

The theory of Metzger discussing the form of trunks on the assumption that the tree must be a pole having an uniform resistance against wind has been applied to the red Yezo-spruce growing in the Teshio district of Hokkaido.

We found that the theory holds true in case of the trunks higher than 7 meters above the ground.

The crown of a tree also has some influences upon the volume of the trunk.

(2) Contraction in the width of boards.

The following equation which has been proposed by Greenhill denotes the contraction in the width of a disk-board:—

$$y = 1 - \sqrt{\cos^2 \theta (1-r)^2 - \sin^2 \theta (1-t)^2}$$

where

y = contraction of a disk board,

r = contraction in the direction of a radius having an

angle θ with a ring, and

t = contraction in the direction of a tangent having an angle θ with the ring.

Using the above equation we at first determined the contraction found on each point of disk boards obtained from a log, then calculated the contraction of each board and obtained the average value of all of them. Bulletin No. 5.

Investigations on the naval stores in Hokkaido.

(1) Collection of balsam from the blisters on the bark of Todo-firs.

No one did not pay any attention to the production of naval stores in Hokkaido until 1940 when we attempted to obtain balsam and turpentine from Todo-firs, Yezo-spruces and some other coniferous trees. This is the first report on the systematical investigations to produce and utilize as well as to clarify the properties of such naval stores which are obtainable in our Hokkaido.

Three districts were chosen and the average number, size and balsam content, etc. of blisters found on the bark of Todo-firs were studied. Distribution curves of the blisters found on the stem of each investigated tree with regard to their size and balsam content are shown.

(2) Collection of turpentine from black and red Yezo-spruces.

The most prevailing method of obtaining turpentine

from the red pine trees in Honshu is to collect the sap from the fresh oblique ridges in the cup hanged on the trunks of the trees. These V-shaped ridges are made with a kind of saw every day or every other day. But when it is performed on the Yezo-spruces in Hokkaido, the cost of turpentines became extremely expensive mainly due to their poor flow.

So we attempted to apply the other method by using large chisels for cutting, and the turpentines were collected in cups. But the greater part of the turpentines were left on the wounded surfaces of the trunk, and were easily collected by means of a spatula. This method needs a longer period but far less laborers than the one with saws and cups.

Bulletin No. 6.

(1) Mechanical properties of snows and its resistance against sleighs.

We studied about such mechanical properties of snows in the beginning of the thaw season as the density, shear, tension and temperature. We investigated the variation of snows and the resistance against sleighs in January, February and March. Sledging is the most important way of lumber transport in winter Hokkaido.

(2) A study on the working time of log trans-

port in winter.

(1) Log transport by horse and sleds.

To establish a standard laboring system, we have investigated the working time of log transportation in winter by horses and small sleds.

The time required to carry out every kind of the element of tasks has been measured with three classes of laborers according to their individual abilities. Of all working time, the manual laboring time occupied 59-74%, and the avoidable loss of time was only 2%.

Bulletin No. 7.

An interim report on the growth of forest trees of the foreign habitats (including different habitats of homeland).

This term for investigation was proposed by our director Dr. Y. HARADA in the 9th Directors Conference of Experiment Stations of Forestry in Japan (1939), thus all stations are supposed to investigate it in their vicinities.

(1) On the growth of Japanese Cryptomeria, kunugi (*Quercus serrata*) and Paulownia at Maruyama Park, Sapporo.

We studied the composition and increment of the

Cryptomeria forest (52 years old) and the kunugi forest (50 years old) at the Maruyama Park. The growth of Paulownia trees (27 years old) was also investigated.

(2) Comparison of structures and increments of planted forests of Japanese cypress, Cryptomeria and Korean pine with those of Todo-fir at Niikappu Estate.

We investigated the forests of Japanese cypress (29 years old), Cryptomeria (24 years old) and Korean pine (24 years old), comparing them with Todo-fir (26 years old).

(3) Sylvicultural observation of Japanese red pine at Niikappu Estate.

We investigated a Japanese red pine forest (32 years old) from the climatic view-point.

Bulletin No. 8.

Illustration of the inedible mushrooms found in northern parts of Japan.

Attempting to publish illustration of all mushrooms found in northern parts of Japan, we at first wrote about the poisonous ones. This bulletin shows 22 beautifully colored figures specially printed by the Japanese wood-cut process.

Pamphlet No. 1.

Crop forecasting of the seeds of Todo-firs.

During the summer time the youngest twigs of Todo-firs bear female flower buds which will grow up to cones in the next year. They can be distinguished at sight from the male flower buds or leaf buds.

So one can easily forecast the approximate production of the seeds in the next year when one climbed mother trees to collect the cones of this year.

Twigs and buds are illustrated.

Pamphlet No. 2.

Observations on the falling and germination of forest tree seeds.

This pamphlet is written about experimental observations on falling seeds of the Todo-fir and Yezo-spruce to the ground of the forest and their germination. On the speed of falling seeds, we studied in still air in a laboratory as well as in field. We investigated the amounts of falling seeds in various directions and distances from mother trees during about every ten days, studied the relationships between the percentage of germination and the weight of fallen seeds, and determined the place or the location where the best germinative seeds were found.

Pamphlet No. 3.**The hotbed nursing in the districts of high altitude and its effect.**

When the intensive culture of the seedlings are wanted in the year of deficient seed crop, it is advisable to use the hotbed nursery, sowing the seeds during the fall. It is also effective to place the wooden frames on the ordinary seed-beds and cover them with glass, paper or lawn.

The rate of germination and the growth of the seedlings of Todo-firs and Yezo-spruces in every kind of the nurseries treated above have been thoroughly investigated.

Pamphlet No. 4.**The density of snows at the thawing seasons.**

This pamphlet is written about the observations on the density of snows at the thawing season of 1943 in Jozankei Imperial Forests, comparing the inside with the outside of the forests, southern with northern inclination, the brookside with the plain. Observations were also made about timely variation of the density at the same place under various conditions.

Pamphlet No. 5.**An universal seeds-sifting machine.**

We succeeded in improving a sifting machine for

forest tree seeds and wrote in this pamphlet about its plan and structure as well as its faculties, comparing them with ordinary patterns. The distinctive features of the new pattern are that we can sift seeds easily by one process keeping in connection with sieve-selection and wind-selection in 30 % shorter hours and obtain seeds in better purification and much quantities than by ordinary processes.

Pamphlet No. 6.**Storing can and storehouse for the forest tree seeds.**

We planned and built a cold storehouse using natural snowy ice for the preservation of forest tree seeds and it proved to be one of the best long-time preserver for tree seeds in the northern snowy districts. Moreover, we improved a kind of storing cans for seeds which were perfectly shut off from the outside air and were kept cool from outside temperature.

Pamphlet No. 7.**Working abilities of the forest laborers in felling and in log-making.**

The time required to fell down the unit volume of a tree, or to make the unit volume of log has decreased gradually with the increase in the diameter of the tree.

Each forest laborer has employed his most favorite

tool for the greater part in his course of working, some one with an ax while the other with a saw.

Before and after the work the physical strength has been tested individually and we have found that young laborers showed much more fatigue than old men of experience, because the formers worked very hard with all their might.

Difference between the working ability of the laborers coming from Honshu and that of those of Hokkaido has also been studied.

Pamphlet No. 8.

Use of the Todo-fir needle-oil as a gasoline substitute.

The Todo-fir needle-oil can not be used by itself as a fuel for the automobiles owing to its high initial boiling point and tarry substances left in the cylinders after the combustion. But when its lighter fraction, corresponding to 60-70% of the oil, is mixed with 30% commercial gasoline, it can be used satisfactorily for automobiles and other gasoline engines.

Our repeated road tests may briefly be summarized as follows:

	(B)	(A)
Fuel		
Distance (km)	16,0	16,0
Time wanted	23' 10"	23' 23"

Average speed (km/hr)	41,4	41,1
Fuel consumption (l)	2,23	2,05
thus - km/l	7,17	7,80
" ratio	100,0	108,8
cc/km	139,4	128,1
" ratio	100,0	91,9
l/hr	5,78	5,25
" ratio	100,0	91,1

where

(A) the light fraction of needle-oil mixed with 30% commercial gasoline, and

(B) a kind of gasoline used by the Japanese Army.

Various properties have thoroughly been studied from the standpoint of fuel chemistry.

The exhausted gases were also collected during the tests. By the analysis of them we found that the engine had not been in its best condition.

Pamphlet No. 9.

Management of forest machinery.

Collected papers spoken of at the lecture-class for bringing-up the truck-drivers and locomotive-engineers working in the Sapporo and Asahikawa District Imperial Forestry and Estates Bureaus.

General informations, precautions and the methods of overhaul, etc. are being given.

Pamphlet No. 10.

General survey on the investigations of the year 1943.

The contents are divided into six groups, namely :—

- 1) Afforestation,
- 2) Utilization,
- 3) Chemistry,
- 4) Management,
- 5) Meteorology, and
- 6) Protection.

Each contains several items discussing our experimental or observational results up to the year 1943, some of them being interim reports written in details to some extent.

Pamphlet No. 11.

Diameter class guages for small stems.

Here are introduced the two kinds of diameter class guages for small stems recently devised in the United States.

We also made two kinds of them for the same purpose and discussed their advantages as well as their disadvantages.

Pamphlet No. 12.

The forest labors in Hokkaido.

This is one of the addresses given at the meeting

of our 3rd anniversary of the foundation.

A detailed consideration about the serious situation of the forest labor in Hokkaido at that time was given by Mr. R. OKAMOTO, the Director of the Sapporo District Imperial Forestry and Estates Bureau, on the basis of the data collected from various viewpoints.

Pamphlet No. 13.

Forest products as a food supplement.

(1) Feeding experiments on live stocks with fodder containing wood-flour.

Two hogs were fed on the same quantities of either (1) boiled kitchen-garbage or (2) the same mixed with 20-30% of various kinds of wood-flour or sometimes sawdust for five months.

The hogs took them all willingly and no marked differences have been recognized between the two growth curves throughout the period of the experiments.

The annual production of sawdust is estimated in the appendix.

Pamphlet No. 14.

The Greater East Asia War and the fuel problem in Japan.

This is also one of the addresses given at the meeting of our 3rd anniversary of the foundation.

Professor H. OTSUKA has at first explained the pre-

war condition of the petroleum produced in the Netherland East Indies. He stated that Japan could not be satisfied if she got in possession of all these resources and emphasized the necessity of the researches and the production of artificial liquid fuels.

Pamphlet No. 15.

General survey on the vegetation in Manchuria, Mongolia and North China with special references to the distribution of forest plants.

This is also one of the addresses given at the meeting of our 3rd anniversary of the foundation.

Assistant professor, Dr. M. TATEWAKI who has made several tours through Manchuria, Mongolia and North China, made a report on the vegetation of these countries.

Pamphlet No. 16.

On the fruitage of beech-trees.

We wrote on the fructifying of beech-trees in southern parts of Hokkaido in 1944.

Pamphlet No. 17.

Chemistry and production.

This is an address broadcasted from JOIK by our director Dr. Y. HARADA.

The chemistry is undoubtedly playing important roles in all productive industries. But we must pay far more

attention to the increase in production by chemical treatment of the forest products. For instances he introduced our chemical investigations.

Pamphlet No. 18.

Annual production of the branches and needles of Todo-firs and Yezo-spruces in Hokkaido.

We reported on the producible quantities of branches and needles in all Hokkaido with reference to needle-oil production, estimating them roughly by the annual yield of lumber.

Pamphlet No. 19.

Preparation of the needle-oils.

An apparatus for the steam distillation of needle-oils can be made by simple reconstruction of a gasoline container (50 gallons). It is easy to carry with the producers wherever they go.

By using this apparatus the yield of oil increased to some extent.

An example is illustrated.

It was suggested that 4-6 of these apparatuses can be arranged in a series by connecting them to each other with a common cooler and a receiver being placed at the end.

Pamphlet No. 20.

Content of essential oils in the twigs and needles

of Todo-firs.

When the twigs and needles of Todo-firs are preserved in the open air, their apparent oil content increases gradually during the first about 50 days.

The oil content has been determined with the six kinds of subvarieties, or forms of Todo-firs grown in the Esashi district, a southern part of Hokkaido.

Pamphlet No. 21.

Extraction of spring sap from maple-trees.

We wrote of extracting and gathering the spring sap of maple-trees for maple sugar and maple syrup. Maple-trees are widely distributed in all parts of Hokkaido, thus liberal quantities of material for syrup industry being present.

Pamphlet No. 22.

Distillation process of the needle-oil with the modified HES-type apparatus.

This is the more advanced and popularized method for obtaining needle-oils than what has been reported in Pamphlet No. 19. The needles and the twigs of Todo-firs are boiled with water in a newly reconstructed gasoline container (50 gallons). The same yield was obtained in a shorter time with less quantities of fuel-woods, thus the distillation being carried out three or four times a day.

The construction is also being illustrated.

Pamphlet No. 23.

Preparation of resin soap.

We investigated the process of preparing resin soaps with the colophony of Todo-fir or Yezo-spruce, wood-ashes and bentonite, to fill up deficiency of ordinary fat soap: utilizing the latent resources in the forests. In this pamphlet, the process, properties and notice for its use are described, in comparison with the ordinary soap.

Pamphlet No. 24.

Studies on the woods resistant to shipworms.

Yezo-spruce and oak were tested in making the Tereido-resistant keels and skins under the water-line.

The two kinds of each specimen, (1) a phenol-formaldehyde resin has been impregnated on the surfaces of a pillar, and (2) a thin board of the same material has been placed with the same resin on each face of a pillar, were soaked into sea water for 80 days with each non-treated material of the same size, and we found that the impregnated specimens were the best.

Generally speaking, the oak is more resistant against shipworms than the Yezo-spruce.

Pamphlet No. 25.

Delousing effect of the quassia extracts.

(1) The effect upon the *Anoplura*.

Quassia extracts did not have any decisive delousing effect upon the sucking lice, *Solenopotes capillatus* *Enderlein* of the order *Anoplura* when applied to the hide of cattles. But we found that the water extracts of quassia bark were more effective than those of quassia wood.

(2) The effect upon the *Mallophaga*.

The most prevailing kind of lice found on the hide of cattles in Hokkaido is a biting or chewing species, *Trichodectes bovis* (*Linnaeus*) of the order *Mallophaga*.

The same reagents mentioned in this first report have been also applied and we found that the lice which came in contact with the liquid have been perfectly killed. It also seemed that these lice have a habit of keeping away from the active principle.

Pamphlet No. 26.

Practical methods of dyeing with plant extracts.

White cotton cloths were dipped into the following two solutions alternatively and we obtained beautiful khaki cloths.

(A) A dark brown liquid obtained by soaking the

skins of raw onion into hot water.

(B) Ferrous sulphate solution as a mordant.

Afterward we have found that the hot spring of our sanatorium at Jozankei can be used instead of the (B) solution.

But the specimens were not stable enough to satisfy all items of the Japanese Army's standards.

Pamphlet No. 27.

On the deflexion of some of the more important woods in Hokkaido. Preliminary report. Yezo-spruce, Todo-fir and basswood.

We prepared very thin boards ($220 \times 20 \times 2$ mm) from the three important woods in Hokkaido and determined the Young's modulus from the deflexion caused by giving a concentrated load on the free end of the cantilever.

Pamphlet No. 28.

A simple method of tea substitute making with plant leaves.

We investigated and succeeded in making a tea substitute with leaves of silk-willow (*Salix viminalis* var. *yezoensis*), mountain ash (*Sorbus Aucuparia*), elm (*Ulmus japonica*), mountain cherry (*Prunus Maximowiczii*) and wild mulberry (*Morus bombycis*).

The tea substitute contains much vitamin C but no

theine, and one can hardly distinguish it from real green tea in color as well as in taste.

Pamphlet No. 29.

Forest products as a food supplement.

(2) Feeding experiments on live stocks with fodder containing wood-flour.

This report is given on the progress of growth and anatomical investigation after slaughter of the hogs that had been treated in the pamphlet No. 13.

The tested hogs were fed chiefly with kitchen-refuses supplemented with 20-40% wood-flour. We investigated that the hogs fed with 20-30% wood-flour grow as well as ordinarily fed hogs and we could not notice any harmful effect by the supplement, while we noticed that the hogs fed with more than 35% wood-flour grew less than ordinary ones. And yet, we recognized that the hogs fed with 20-30% wood-flour had more pork in the limbs, more pure fat in fat tissues of the pork and had the same appearance and taste when compared with common merchandise pork.

Pamphlet No. 30.

Use of lichens as an oil pad in shaft-boxes.

Physical properties of the two kinds of lichens (*Usnea longissima* Ach, and *U. diffracta* Wain) collected in the Teshikaga district have been examined to determine

whether they can or can not be used as an oil pad, instead of usual wastes, in the shaft-boxes of log-transporting trucks.

It is our opinion that these lichens can be used if they have been treated with weak alkalis, because, after the treatment, they increase their oil-holding capacity to the point not far from that of cotton waste and also are quite strong.

Pamphlet No. 31.

Forest products as a food supplement.

(3) Feeding experiments on horse with fodder containing wood-flour.

The contents are divided into three parts.

(A) General consideration about the experiments up to this time.

(B) Our new experiment which has been tried at the Niikappu Imperial Pasture from Feb. 25th, 1945 to Apr. 25th, 1945.

A horse was fed with the customary fodder, while another with the same quantity of fodder in which the concentrates had been partly substituted with varying quantities (10-30%) of wood-flour. Up to 20% no marked differences were observed between them from the veterinarian view-point.

(C) As the previous experiment was doubtful, the

same investigation was repeated from Aug. 5th, 1945 to Oct. 3rd, 1945, with the horses being changed with each other. The result was quite satisfactory, as the horse could work as before even with the use of 30 % of the wood-flour.

Pamphlet No. 32.

A modified lamp for the use of needle-oils.

In Hokkaido, there are still more than 170,000 houses which can not utilize electricity at all. The needle-oils can not be used as a lamp-oil because of its low flash-point and the production of lampblack.

We, therefore, reconstructed the upper seat of the ordinary lamp to regulate the supply of air, thus the formation of the carbon black has been avoided and the inflammation of the oil in the bottle has also been overcome by closing the air holes of the center seat.

The lumidity of the needle-oil is almost equal to that of the kerosene under the same conditions, while the rate of consumption of the former in a definite time corresponds only to 60% of that of the latter.

Cautions are also written here.

昭和二十一年十月二十日 印刷

昭和二十一年十月三十日 發行

札幌市登平

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