1-1-1914

Bulletin No. 104 - Forage Crops

University of Wyoming Agricultural Experiment Station

Follow this and additional works at: http://repository.uwyo.edu/ag_exp_sta_bulletins

Part of the Agriculture Commons

Publication Information
University of Wyoming Agricultural Experiment Station (1914). "Bulletin No. 104 - Forage Crops." University of Wyoming Agricultural Experiment Station Bulletin 104, 9-22.
Oats and Peas for Ensilage.

FORAGE CROPS

By T. S. Parsons, Agronomist.

Bulletins will be sent free upon request. Address: Director Experiment Station, Laramie, Wyoming.
UNIVERSITY OF WYOMING
Agricultural Experiment Station
LARAMIE

BOARD OF TRUSTEES

Officers.
TIMOTHY F. BURKE, LL. B. ........................................... President
C. D. SPALDING ..................................................... Treasurer
FRANK SUMNER BURRAGE, B. A. .................................... Secretary

Executive Committee.
A. B. HAMILTON ........................................ T. F. BURKE ........ W. S. INGHAM

<table>
<thead>
<tr>
<th>Members</th>
<th>Term</th>
<th>Appointed</th>
<th>Expires</th>
</tr>
</thead>
<tbody>
<tr>
<td>HON. GIBSON CLARK</td>
<td>1915</td>
<td>1908</td>
<td></td>
</tr>
<tr>
<td>Hon. W. S. INGHAM, B. A</td>
<td>1915</td>
<td>1911</td>
<td></td>
</tr>
<tr>
<td>HON. C. D. SPALDING</td>
<td>1915</td>
<td>1912</td>
<td></td>
</tr>
<tr>
<td>HON. ALEXANDER B. HAMILTON, M. D</td>
<td>1917</td>
<td>1911</td>
<td></td>
</tr>
<tr>
<td>HON. LYMAN H. BROOKS</td>
<td>1917</td>
<td>1913</td>
<td></td>
</tr>
<tr>
<td>HON. CHARLES S. BEACH</td>
<td>1917</td>
<td>1895</td>
<td></td>
</tr>
<tr>
<td>HON. TIMOTHY F. BURKE, LL. B</td>
<td>1919</td>
<td>1913</td>
<td></td>
</tr>
<tr>
<td>HON. MARY B. DAVID</td>
<td>1919</td>
<td>1914</td>
<td></td>
</tr>
<tr>
<td>HON. MARY N. BROOKS</td>
<td>1919</td>
<td>1912</td>
<td></td>
</tr>
</tbody>
</table>

Hon. ROSE A. BIRD MALEY, State Superintendent of Public Instruction. Ex Officio
PRESIDENT C. A. DUNIWAY, Ph. D. Ex Officio

STATION COUNCIL.

C. A. DUNIWAY, Ph. D. .................................................. President
HENRY G. KNIGHT, A. M. .............................................. Director and Agricultural Chemist
F. S. BURRAGE, B. A .................................................. Secretary
C. D. MOIR .............................................................. Clerk
A. NELSON, Ph. D ....................................................... Botanist and Horticulturist
J. A. HILL, B. S ....................................................... Wool Specialist
O. L. PRIEN, M. D. V .................................................. Veterinarian
J. C. FITTERER, M. S., C. E .......................................... Irrigation Engineer
A. D. FAVILLE, B. S.* ................................................ Animal Husbandman
T. S. PARSONS, M. S .................................................. Agronomist
S. K. LOY, Ph. D ....................................................... Chemist
J. E. MCWILLIAMS, B. S ............................................. Animal Husbandman
J. W. SCOTT, Ph. D .................................................... Parasitologist
KARL STEIK, M. A ..................................................... Engineering Chemist
O. H. BEATH, M. A ..................................................... Research Chemist
F. E. HEPNER, M. S.* ................................................ Assistant Chemist
E. N. ROBERTS, B. A .................................................. Assistant Chemist
S. M. FULLER, B. S .................................................... Wool Assistant

*Absent on leave.
*Resigned Sept. 1, 1914.
Forage Crops

T. S. PARSONS, Agronomist

INTRODUCTION.

During the past four years some experiments have been conducted at the Experiment Station with a view of gaining some information as to the adaptability of various forage crops to the soils and climate of Wyoming. Numerous inquiries have been received from new settlers and others as to what crops can be grown the first year or two for pasture, hay and forage, to tide them over the time until the land will produce a crop of alfalfa or other hay.

The general subject of forage crops will be treated under three heads as follows:

1st. Leguminous forage crops.
2nd. Gramineous forage crops.
3rd. Miscellaneous forage crops.

DEFINITIONS.

A forage crop is any crop the leaves or stems or both of which are used either green or dried for feeding to stock. The green plants may be grazed as in a pasture or they may be cut and fed green as a soiling crop.

Hay is the cured or dry stems and leaves of the
finer grasses and other forage plants.

*Fodder* is the cured stems and leaves of corn, sorghum, or other coarse plants cut just before maturity and fed without removing the grain.

*Stover* is corn or other fodder from which the grain has been removed.

Certain forage plants, of which corn is the principal one, may be cut green and stored in the silo; the product is then known as *silage* or *ensilage*.

The average altitude of the farming land in Wyoming is 6000 feet. Therefore, it is impossible to grow corn even for forage in many parts of the state. This being the case, it is necessary to grow those crops that will take the place of corn both as dry forage and preserved as silage. For this reason corn will not be discussed in this bulletin.

**LEGUMINOUS FORAGE PLANTS.**

Under this head may be placed such crops as alfalfa, field peas, vetches and sweet clover. The hardier varieties of beans and the Whip-poor-will cow peas may be
added to this list for the lower altitudes of the state.

Alfalfa is pre-eminently the great forage crop for the semi-arid regions. Every farmer should grow some alfalfa as soon as he can get his land in shape for it. It is difficult, however, to get a stand of alfalfa on new breaking and a full crop is not produced until the second or third year after seeding, so it is necessary for the farmer to grow some other crops as forage until he can have the alfalfa. A fuller discussion of alfalfa will be left for another bulletin.

Field Peas—Field peas are undoubtedly the best of the annual legumes for the higher altitude conditions. They are a cool climate crop and do best where the nights are cool and the days not too warm. A large yield per acre of either green forage or cured hay may be obtained. Peas being nitrogen gatherers also have a beneficial effect on the soil, and probably fit the soil better for alfalfa than do many other crops. It does not innoculate for alfalfa as the bacteria found on the roots of the pea plants are not of the same species as those found on the alfalfa roots, but there seems to be a physical effect on the soil that is beneficial to the alfalfa.

In the spring of 1910 two small areas were sown to alfalfa. One had been in grain the preceding year and the other in field peas. The soil of each plot was alike and the seeding was done at the same time. The plat that had been in peas gave a perfect stand of alfalfa, while on the plat that had been in grain the preceding year a very poor stand was obtained. The soil on the former plat was in better condition and was compacted more easily after plowing. One of the main factors in successful alfalfa growing is a well-prepared and well-compacted seed bed. The experiment is not of sufficient extent to prove conclusively that the good stand was due
to the peas but indications would seem to point that way. A farmer in the Encampment Valley who sowed a field of alfalfa in the spring of 1913 under directions from this Station reported alfalfa seed sown after peas, April 1st, gave a good cutting of hay, August 10th.

Peas and Oats—Peas being of a trailing or climbing habit of growth, it is generally better to plant them with some grain. Oats, barley, rye or emmer may be used. The straw offers a support for the peas to climb up and they will thus be held up from the ground, make a better growth and the lower leaves will not turn yellow and die as they do when the peas are grown alone. The peas and oats also make a good ensilage crop when cut green and put in the silo. All of the peas and oats grown on the Experiment Farm in 1913 were used for this purpose and are now being fed to stock with good results.

Soils—Peas and oats for forage will do very well on nearly all soils. Better soils will of course produce better crops. They have been grown on a variety of soils on the Experiment Farm, from heavy clay to sandy loam. Barnyard manure has proved beneficial to the crop.

Preparation of the Soil—The soil should be thoroughly prepared to make a good seed bed and sowing should be done early, at the higher altitudes as early in the spring as the ground can be worked.

Methods of Sowing—The usual plan has been to sow the oats and peas together, either broadcasting or drilling. It is difficult to set the drill, however, to sow the proper amount of each at the same time, and it has been observed that in many cases when the crop is cut there is a much larger percentage of oats than peas. The oats seem to grow more rapidly and crowd the peas out. Peas will stand deeper planting than oats, therefore, although experiments have been carried out along this line, it is suggested that the peas be sown broadcast and disked in to the depth of at least three and one-half inches, or they may be drilled in, and ten days or two weeks later drill in the oats shallower. Thus the peas will have obtained
a good start and will not be so apt to be crowded out by the oats.

Amounts to Sow—The amounts to sow will vary with conditions. Where irrigation is practiced, 60 lbs. of peas and 35 to 40 lbs. of oats per acre should be sown. Under ordinary dry farm conditions where the annual rainfall is from 14 to 18 inches, 25 to 30 lbs. of each should be sown.

Varieties of Peas—The White Canada is the variety most generally grown. The high prices for seed prevailing the last two or three years, however, have made the use of this seed almost prohibitive. The Colorado Stock Peas have been used at the Station the last two years and have been found fully as satisfactory as the Canadian variety and have the advantage of being much cheaper.

The Colorado Stock Pea is a hybrid which originated in the San Louis Valley of Colorado. It probably came from the Golden Vine intermingling with the Native or Mexican peas. It grows tall and has purple blossoms. It is fully as hardy as the Canadian pea and as good a yielder.

Three new varieties of field peas were imported by the Department of Agriculture and sufficient amounts of each were sent to this Station for trial in 1913. The three varieties, known as Bangalia, Amraoti and Kaiser, made fair yields of forage but no better than the Canadian or the Colorado Stock Peas. They need to be tested further as regards their value for either seed or forage.

Peas with Other Grains—Peas may be sown with fairly good results with other grains, such as barley, rye and emmer, but the combination with oats usually gives the best results, altho a heavy yield of peas and emmer was obtained on the Experiment Farm in 1912. (See Table). Barley is very good for late sowing as it grows more rapidly and does better in hot weather than oats.

Vetches—The vetches generally grown are of two kinds, spring vetch (*Vicia sativa*) and the hairy or winter
vetch (*Vicia villosa*). The latter is the only one that is recommended for Wyoming conditions. It may be sown in the fall with rye and under ordinary conditions will produce considerable forage. It has been sown with fall rye at the Experiment Station but winter killed badly. At the lower altitudes of the state it should be a good crop for fall sowing with rye, or wheat. It is quite hardy and alkali resistant. germinating well on soils too alkaline for most legumes. The plat on which rye and vetch was sown in the fall of 1911 on the Experiment Farm was quite alkaline, in fact so alkaline that field peas sown on it the previous year did not germinate. The vetch germinated readily and grew well in the fall. The small yield was due to winter-killing.

Rye and Vetch—On May 9, 1911, a one-half acre plat was sown to one bushel of spring rye and 12 lbs. of spring vetch (*Vicia sativa*). The rye made an excellent growth but the vetch did not come well so it was decided to let the rye ripen for seed. The plat produced 343 pounds of grain, or at the rate of 14.9 bushels per acre. If the plat had been cut green for forage it probably
would have produced about one ton of rye hay.

Another half-acre plat was sown on the same date to one bushel of oats and twelve pounds of vetch. This made a good growth and was given but one irrigation of 1.05 feet of water during the season, and two cuttings of forage were made, the first on July 31st of 1810 lbs. of cured hay and the second on September 5th of 880 lbs. of cured hay, a total for the plat of 2690 lbs., or a yield of cured hay of 2.19 tons per acre.

Oats and vetch made a good forage, probably as high in feeding value as oats and peas, but the oats and peas will give a larger yield as vetch does not germinate as well as the peas, altho a heavier sowing of the vetch would probably be better.

In 1912, one acre was devoted to forage crops for the purpose of comparing vetch and oats, peas and oats, and peas and barley. One-quarter acre was devoted to each crop. Thru a misunderstanding on the part of the man seeding, peas and emmer were combined instead of peas and barley.

All of the plats were sown on May 20th. The plats received but one irrigation and all of the plats were cut on August 16th. The average height of the grain was forty inches and just in the dough stage when cut. Yields for each quarter-acre were as follows:

- Vetch and oats, 980 lbs.
- Peas and emmer, 1040 lbs.
- Peas and oats, 600 lbs.
- Hanna barley, 770 lbs.

The barley alone made a good yield of hay. This variety is a two-rowed species and is very leafy, being probably the best barley for forage. Had it been combined with peas the yield would probably have been heavier.

The emmer and peas made the best yield in the trial and it would seem that this combination would be a good
one for forage. The yields given in each case are of cured hay.

Sweet Clover—The sweet clovers are biennial plants belonging to the clover family. They do not produce flowers or seed until the second year, when they mature seed and die. There are two species, the white and the yellow. The white is most extensively grown and is the best forage. On account of its scarcity the seed is more expensive than the yellow. For this reason the yellow is often grown instead of the white. During the past three years the white sweet clover has been grown under various conditions at this Station with good success, and stock have eaten it readily. Small amounts of the yellow have been grown but it has not produced as much forage as the white. At the east side of the Agronomy Farm is an area of land consisting of about four acres which receives seepage from the land above and consequently is too alkaline for the growing of grain crops. According to records, this area was sown to white sweet clover in 1908. A fair crop was harvested in 1909 and in 1910, after the writer took charge, one and one-half tons of cured hay was produced on the area from one cutting. A heavy frost on August 24th prevented a second cutting and no seed was produced. In the spring of 1911 no growth of sweet clover appeared, according to the nature of the biennial. This does away with the theory sometimes advanced that sweet clover will spread badly when once sown and becomes a bad weed pest. If cut before it goes to seed there is no danger of its spreading, and it makes an excellent quality of hay if cut before the stems become woody. These plats have been kept in sweet clover (new sowings being made every two years), as no other plants other than some of the native grasses will grow on these plats which are heavy clay and strongly alkaline. The plats are low and receive some seepage, consequently do not require heavy irrigation. The land received .274 feet of irrigation water and .362 feet of rainfall, or a total of .636 feet of water.

Sweet clover will also do well on the dry farm. On
May 4, 1911, an area of two acres was sown to sweet clover on the Holliday farm in the dry farm experiments then being carried on. The crop was sown at the rate of 10 lbs. per acre. The plants made considerable growth that year but not sufficient for cutting. One acre was badly covered by blowing soil; the other acre, however, produced 3700 pounds of hay the following year. Sweet clover can be grown successfully without irrigation on lands too dry for alfalfa.

**GRAMINEOUS FORAGE CROPS.**

This group includes all of the grasses and grains grown and cut for forage, whether fed green or cured for hay. Some of the grains have been discussed with the legumes, so no further discussion is needed here except to say that they are better grown in combination with legumes, especially field peas, as in this way larger yields are obtained and they also make a better balanced ration. Oats, barley, and rye are the grain plants most commonly grown for forage. Experiments with various grasses and grass mixtures are being carried on to determine those of most value for the pastures and hay.
Full discussion of these will be given in a future bulletin. It will suffice to say here that Brome Grass (*Bromus Inermis*) has been found to be an excellent pasture grass, forming a very thick sod after two or three years. It starts growth very early in the spring and remains green late in the fall. It is better adapted for pasture than it is for hay, altho it will produce a good quantity of hay when well cared for. In 1913, a quarter-acre plat that had been sown in 1911 produced 1000 lbs. of cured hay. This is at the rate of two tons per acre.

**MISCELLANEOUS FORAGE CROPS.**

This group includes such crops as millets, sorghums, Kaffir corns, etc., which, altho they belong to the Gramineae, make rather a group of themselves, and can be grown in various parts of the state. On account of conditions at this altitude, not much has been done along the line of experimentation with these crops. The Manitoba or Hog Millet and the Siberian Millet do fairly well but are quite easily injured by frosts and do not make heavy yields. The Kirsk Millet, now being distributed by the Government, promises fairly well. It is being tried both under irrigation and dry farming conditions. Reports from sections of the state at altitudes not above five thousand feet indicate that most of the millets, sorghums and kaffir corns can be successfully grown for forage and in some instances corn, especially the flint varieties. Early Amber Sorghum, Yellow Milo Maize and Kirsk Millet are recommended as the hardiest crops of this group.

Rape has proved a good forage crop at this Station. It is easy to grow and produces a large yield of succulent forage, adapted to hog or sheep feeding. It is not cut but pastured in the field. Sheep and hogs like it and do well when fed on it.

Many inquiries have come to this office concerning the new forage plant, Feterita. This is a warm climate plant belonging with the sorghums and it is very doubtful if it can be grown successfully anywhere in Wyoming.
### LIST OF FORAGE CROPS.

<table>
<thead>
<tr>
<th>Name of Crop</th>
<th>Year</th>
<th>Area</th>
<th>Date Sown</th>
<th>Date Harvested</th>
<th>Yield in lbs.</th>
<th>Tons per A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Peas</td>
<td>1910</td>
<td>2-1</td>
<td>May 10</td>
<td>Sept. 10</td>
<td>10,000</td>
<td>2.</td>
</tr>
<tr>
<td>Amber Cane</td>
<td></td>
<td>2</td>
<td>May 20</td>
<td>No Crop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn, 4 varieties</td>
<td></td>
<td>1</td>
<td>May 15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oats</td>
<td></td>
<td>1</td>
<td>Apr. 10</td>
<td>Aug. 25</td>
<td>2,210</td>
<td>2.21</td>
</tr>
<tr>
<td>Sweet Clover</td>
<td></td>
<td>1</td>
<td>1909</td>
<td>Aug. 24</td>
<td>3,000</td>
<td>1.5</td>
</tr>
<tr>
<td>Rape</td>
<td></td>
<td>1-2</td>
<td>Apr. 15</td>
<td>Aug. 30</td>
<td>10,000</td>
<td>10.00</td>
</tr>
<tr>
<td>Oats and Vetch</td>
<td>1911</td>
<td>2</td>
<td>May 9</td>
<td>Jul 29</td>
<td>2,69</td>
<td></td>
</tr>
<tr>
<td>Sweet Clover</td>
<td></td>
<td>1-4</td>
<td>May 20</td>
<td>No Crop</td>
<td>2,000</td>
<td>1.</td>
</tr>
<tr>
<td>Corn, 2 varieties</td>
<td></td>
<td>1</td>
<td>May 24</td>
<td>Sept. 4</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Peas and Emmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas and Oats</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td></td>
<td>1-4</td>
<td>May 20</td>
<td>Aug. 16</td>
<td>1,040</td>
<td>2.08</td>
</tr>
<tr>
<td>Corn, 15 varieties</td>
<td></td>
<td>1</td>
<td>May 20</td>
<td>Aug. 25</td>
<td>2,000</td>
<td>1.00</td>
</tr>
<tr>
<td>Sweet Clover, irrigated</td>
<td></td>
<td>1-2</td>
<td>May 20</td>
<td>Aug. 16</td>
<td>770</td>
<td>1.54</td>
</tr>
<tr>
<td>Sweet Clover, dry farm</td>
<td></td>
<td>1</td>
<td>May 4</td>
<td>Aug. 25</td>
<td>2,000 est.</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES ON THE TABLES:

1. Sown on plat that was very weedy the preceding year. The crop was largely weeds. This accounts for the low yields. The oats and peas, however, cleaned up the plat and put it in excellent shape for the next year's crop.

2. This was the second year for the sweet clover and the crop was not as heavy as the first year after seeding.

3. The millets made some growth but the plat was very weedy. A paying crop was not obtained.

4. This was the third year for the sweet clover. It self-seeded to some extent from the preceding year. It was cut before seeding this year and the plants had disappeared entirely the next year.

5. This and the four following were cut and hauled to the silo in the green stage. Destruction by gophers caused the small yield.

6. This plat was eaten by gophers which lowered the yield. It made good silage.

Corn, sorg... and milo maize have never made a crop.
CONCLUSIONS:

Peas and oats give the best results under all conditions for either hay or ensilage.

Barley, rye, emmer or oats may be sown to advantage with peas. For late sowing, barley is best. Six to eight tons of peas and oats in the green state can be raised on an acre under the best conditions. Four to five tons per acre make it a paying crop.

At altitude below 5000 feet corn can be raised successfully for silage or fodder at least.

White sweet clover makes a good crop where alfalfa cannot be grown. Stock eat it readily. It will not become a pest if not allowed to go to seed.

Soya beans and cow peas can probably be grown successfully in the lower altitudes of the state.

The vetch may be substituted for peas with oats under some conditions but peas are usually better yielders.

The winter vetch (*Vicia villosa*) may be sown with winter rye on the dry farm to good advantage.

All forage crops do better on well-prepared soil. Legumes used as forage crops perform two offices. They produce a large amount of forage and are nitrogen gatherers which enrich the soil.

Other station reports state that oats and peas are second in the value of corn for the production of forage. One bushel of peas and one to one-half bushels of oats should be sown on an acre.

Some provision for forage crops should be made on every farm to provide against failure of the regular hay crop.

As a heavy growth of plants is desired in forage crops, where irrigation water can be used if conditions are favorable than with grain crops. The crop should never be allowed to suffer for the want of water. Two or three irrigations during the growing season are usually sufficient. There is little danger, however, of giving a forage crop too much water.