Revised July 1957

RICE HULLS AND RICE STRAW, 1907-1955

A LIST OF REFERENCES

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PREFACE

This bibliography is a revision of Library List 31, Rice Hulls and Rice Straw, 1907-1944, compiled by Kyle Ward, Jr., and issued in December 1946. Like its predecessor, it is concerned with analyses of the hulls and straw and their utilization in industry and on the farm. Information on rice bran and rice polish has been omitted.

Revision has consisted chiefly in bringing the bibliography up to date by citing the literature published during 1945-1955 inclusive. Some references from the earlier period have been added, and a few corrections have been made in the original list.

The bibliography is in two parts, the first on rice hulls, the second on rice straw. References dealing with both hulls and straw are not repeated. Cross-references at the beginning of each section direct the reader to pertinent references in the other.

The assistance of Dr. R. W. Planck of the Southern Utilization Research and Development Division, Agricultural Research Service, who reviewed the list and contributed references from his personal file, is gratefully acknowledged.

All references have been examined by the compilers except those marked with an asterisk (*). Abbreviations for the titles of publications cited are explained on p. 331-349 of U. S. Department of Agriculture Bibliographical Bulletin 12. Call numbers following the citations are those of the Department of Agriculture Library.

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BIBLIOGRAPHIES AND ABSTRACT JOURNALS

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SERIALS

Rice Journal 1945-1956.

RICE HULLS AND RICE STRAW, 1907-1955

A List of References

Compiled by Nellie G. Larson
Division of Bibliography, Library

RICE HULLS

See also Items 229 255 264 269 279 297 308 375 384

1. ADACHI, T. Studies on the discoloration of rice husks. (In Japanese.) Tokai-Kinki Natl. Agr. Expt. Sta. Div. Plant Breeding & Cult. B. 2:215-220. Mar. 1955. 87 Ok322
English summary.
About 10 percent of seeds and husks were discolored, apparently due to fungi.

2. *AKTIEN-ZIEGELEI ALLSCHWIL. Mikroporöses feuerfestes Material. Swiss Pat. 292,726 Nov.16, 1953.
Chem. Zentbl. 125:9368. Oct.13,1954.
Rice-hull ash was used.

3. *ALGALITE S. â. r. l. Lightweight insulation. Ital. Pat. 484,118. Aug.29,1953.
Chem. Abs. 49:11258. 1955.
Rice hulls are used in mixture to form cement conglomerates which are fireproof, insulating, and resistant to insects.

4. ALI, M. E., and KHUNDKAR, M. H. Studies on rice husk, betelnut husk and bamboo lignins. I-III. Indian Chem. Soc. J. 30(8):551-555; 31(6):471-479. Aug. 1953; June 1954. 385 In27
Chem. Abs. 48:6116; 49:4987. 1954,1955.
Pt. 1, Isolation by different methods. Pt. 2, Nitrolignins. Pt. 3, Oxalic acid from lignin.
Three methods of lignin isolation produced considerable variation in yield. Rice husk had greatest ease of nitration of the three products used.

5. AMOS, A. J. Rice husks in bran and sharps. Analyst 54(639):332-333. June 1929. 382 An1
Chem. Abs. 23:4752. 1929.
Methods of detecting hulls as adulterants.

6. ANANDAN, M., and REDDY, K. R. A cheap process of preparing charcoal for activated carbon. Madras Agr. J. 31:55-56. Feb.1943. 22 M262
A simplified method of making carbon from paddy husk.

7. ARAUJO, A. A. DE. Semeadura de mesclas de sementes com casca de arroz. (In Portuguese.) Chacaras e Quintais 81(1):75-76. Jan.15,1950. 9.2 C34
Sowing of grass seeds mixed with rice hulls, as developed by O. K. Hoglund of U. S. Conservation Service.

8. ARRAZOLA, J. M. New raw materials for the production of fodder-yeast. Internatl. Cong. Microbiol. 4th, Rpt. Proc. 1947:555-557. 1949. 442.9 In83
Chem. Abs. 44:9115. 1950.
Rice hulls were among the materials hydrolized.

9. AZCARATE, V. E. Productos del arroz como fuente para la alimentación del ganado doméstico. Venezuela. Inst. Nac. de Agr. P. Misc. 3:42-44. Sept.1952. 9.95 M32P.
Rice byproducts as feed for domestic animals.
A table shows composition of hulls, generally considered adulterants in feeds.

*Not examined.

10. *BAIXAULI SIMONS, F. Agglomerates from pressed and semipressed vegetable wastes. Sp. Pat. 206,621. Jan.4,1953.
Chem. Abs. 48:12388. 1954.
Rice hulls were among the wastes used to make a molded panel.

11. BANERJEE, S. L., and GOSWAMI, M. Activated carbon from raw materials available in India. Indian Chem. Soc. J. Indus. & News Ed. 3:75-79. 1940. 385 In27A
Chem. Abs. 35:1600. 1941.
The product of carbonization of rice hulls at 800° was most effective in decolorizing caramel solutions at pH 4.5.

12. BASTONI, V. Furfurolo dalla lolla. Il Riso 2(5):22-23. May 1953. 59.8 R49
Furfural from rice hulls.

13. *BEHERA, H. Fabricated cement articles. Indian Pat. 40,868. Jan.10,1951.
Chem. Abs. 45:5901. 1951.
Paddy husks and straw as filling agents may be incorporated into cement mixtures used in manufacturing roofing tiles, writing boards, slates, containers and dishes.

14. *BELLADEN, L., and GALLIANO, G. The ash of rice chaff as raw material for refractory insulators. Metall. Ital. 33:349-352. Aug.1941.
Chem. Abs. 37:3895. 1943.
Chem. Zentbl. 113(1):2179. Apr.29,1942. 384 C42
Bricks formed of this material make good heat insulation.

15. BERTRAND, G., and BROOKS, G. Analyse et composition des tissus végétaux lignifiés pailles, fibres, coques, etc. France. Min. des Trav. Pub. Off. Natl. des Combustibles Liquides, Ann. 12:905-921. Sept./Oct.1937. U. S. Geol. Survey Libr.
Chem. Abs. 32:3145. 1938.
Abstract in Paris. Acad. des Sci. Compt. Rend. 206:293-295. Jan.31,1938. 505 P21
Analysis and composition of lignified vegetable tissues, straws, fibers, hulls, including rice hulls. Data on moisture; ash; total nitrogen; extraction by water, ethanol, and ether; hydrolysis by dilute acid and sodium hydroxide; and reducing sugars and cellulose are given.

16. BERTRAND, G., and BROOKS, G. Le rendement en furfural de divers tissus lignifiés. Paris. Acad. des Sci. Compt. Rend. 214:295-297. Feb.16,1942. 505 P21
Chem. Abs. 37:6261. 1943.
Yield, on distillation with dilute acid, of 2-furaldehyde from lignified tissues is given, that for rice hulls being 6.94 percent.

*Not examined.

17. BERTRAND, G., and BROOKS, G. Sur le pouvoir calorifique des bois et des tissus lignifiés. France. Off. Natl. des Combustibles Liquides. Ann. 13: 1021-1034. Ref. Nov./Dec.1938. U. S. Geol. Survey Libr.

Chem. Abs. 33:8955. 1939.

Heat of combustion of woods and lignified tissues. Previous data are reviewed and tabulated. New calorimetric determinations give heats of combustion for 24 different straws, fibers, hulls, and shells, including rice husks.

18. BEYER, O. A kísérleti furfurolüzem tapasztalatai. Die Erfahrungen des Furfurolversuchsbetriebes. Magyar Kémikusik Lapja 8(9):259-262. Sept.5,1953. 385 M27

Chem. Zentbl. 125:6101. July 7,1954.

Production of furfural from hulls of rice and sunflower seeds.

19. *BLARDONE, G. Alkali metal silicates from rice hulls. U. S. Pat. 1,293,008. Feb.4,1919.

Chem. Abs. 13:1132-1133. 1919.

20. *BLARDONE, G., NICHOLS, C. W., and BRUGUIERE, F. A substitute for lampblack. U. S. Pat. 1,156,742. Oct.12,1915.

Chem. Abs. 9:3334. 1915.

From rice hulls and chaff.

21. BLARDONE, G., and FORNARIS, J. M. A vegetable equivalent for bone black in sugar refining. La. Planter 58:379. June 16,1917. 65.8 L93

Chem. Abs. 11:3459. 1917.

Decolorizing substance from rice hulls.

22. BODEMULLER, H. R. Chemurgy at work in Louisiana. Natl. Farm Chemurg. Council. Chemurg. Papers 534,4 p. 1947. 381 N213P

Three paragraphs on p. 2, on uses of rice hulls for furfural and as insulant. Rice hulls can be flameproofed at reasonable cost and have insulating value equal to cork.

23. BODEMULLER, H. R. Report on the use of treated rice hulls as a loose insulant. Baton Rouge, La. Dept. Com. & Indus.,1946. 6 p. 291 L93

Typewritten.

This is a resume of a report by Dr. F. W. zur Burg entitled "A study on the feasibility of manufacturing a loose insulating material from rice hulls," 1945, copies of which are on file in the Research Library of the Economic Development Committee of Louisiana, Capitol Building, Baton Rouge.

Gives data on Southern markets for thermal insulation; on availability, collection and transportation of rice hulls as raw material; and on method and costs of treatment to render hulls flame resistant.

24. BORASIO, L. Gas ricco dalla lolla di riso. Risicoltura 32(3):49-53,illus. Mar.1942. 59.8 G43

Chem. Abs. 38:2473. 1944; Chem. Zentbl. 1942: II, 1871.

Gas from rice hulls. Description of an operating plant for the gasification of rice hulls yielding a gas of 3404 calories.

25. BORASIO, L. Proposta di classifica e valutazione commerciale dei più importanti sottoprodotti della lavorazione del riso. Risicoltura 36(1-2):4-8, 35-40. Jan.-Feb.1948. 59.8 G43

Chem. Abs. 44:8011. 1950.

Brit. Abs. B-III 1948:378.

Brit. Abs. C-III 1948:289.

Rice byproduct analysis, including grading and evaluation. Gives method for testing any chaff or husks present in bran or meal. Gives composition for husks.

26. BORASIO, L. La pula di riso e la sua composizione chimica. Gior. di Risicolt. 19:58-61. Apr. 1929. 59.8 G43

Chem. Abs. 23:4752. 1929.

Rice "pula" (meal from the first and second pearling machines) and its chemical composition. These hulls, with polishings added, may be used as feed for cattle.

*Not examined.

27. BORASIO, L. Sul contenuto in silice delle pule italiane. Gior. di Risicolt. 18(1):8-10. Jan.31,1928. 59.8 G43

Chem. Abs. 22:2415. 1928.

The silica content of Italian rice meals. Analyses are given. Italian "pula" is often adulterated and contains up to 9 percent of silica.

28. BORASIO, L. Sulla composizione chimica della lolla di riso. Gior. di Risicolt. 18:48-50. Mar. 1928. 59.8 G43

Chem. Abs. 22:2415. 1928.

Chemical composition of rice hulls which are 18-20 percent of rough rice and contain 41-43 percent crude cellulose. The best possible utilization of rice hulls is for the production of gas, charcoal, tar, and acetic acid by dry distillation. They are useless for feeding or papermaking and have little value as fertilizer or animal bedding.

29. BRAY, C. I. Rice and rice byproducts for fattening swine. La. Agr. Expt. Sta. B. 368,50 p. Ref. 1943. 100 L93

Chem. Abs. 40:4819. 1946.

In three experiments, p. 36-43, rough rice was compared to corn for fattening hogs. The rough rice value was estimated at 88 to 91 percent of the value of corn when well ground and properly supplemented. No bad effects could be attributed to feeding the ground rice hulls.

30. BROWNE, C. A. The chemical composition and feeding value of rice products. La. Agr. Expt. Sta. B. 77:430-455. 1904. 100 L93

Rice hulls and their feeding value, p. 437-440. Animals died from the feed. Methods of analysis for detecting hulls as adulterants in rice bran are given.

31. BUATIER DE MONGEOT, L. Sul razionale impiego del pulone di riso [Utilization of rice husks]. Gior. di Chim. Indus. Appl. 12(2):74-76. Feb.1930. 385 G43

Chem. Abs. 24:5086. 1930.

On the utilization of rice hulls which consist of 60.04 percent volatile matter, 24.79 percent carbonaceous matter, and 15.17 percent ash. Use of siliceous ash is suggested in the glass industry. Dry distillation of hulls gives carbon of low density and a liquid in which acetic and propionic acids, furfuraldehyde, phenol, and cresols were identified. Microscopical examination shows hulls rich in cellulose and they are suggested as a source of industrial alcohol.

32. BURGOS, C. X. Questions and answers in duck raising. Philippine Isl. Dept. Agr. & Com. Food Prod. Serv. L. 10,rev.,19 p. 1947. 25 P533Fp

Rice hulls are used in incubating duck eggs and as litter on floors in hatcheries and "duckeries".

Also in: Philippine Livestock Mag. 1(10):329-330, 350-351,354-356,358,360,338. Dec. 1950/Mar.1951. 49 P53

33. *CASAVECCHIA, E. S. DI. New thermal insulating materials from the ashes of rice chaff. Chim. nell'Indus. Agr. Biol. 18:508-514. Dec.1942.

Chem. Abs. 38:6425. 1944; through Chem. Zentbl. 114 II:2091. 1943.

Insulating bricks from rice chaff are available in Italy under name of "Silex". Properties for them and uses are cited. The ash contained 94.5 percent silica.

34. CECCONI, R., and FERRARI, C. Recherche et détermination de la balle de riz dans les tourteaux de lin. Ann. des Falsif. 28(318):335-346,illus. Ref. June 1935. 389.8 An72

Chem. Abs. 29:6968. 1935.

Detection and determination of rice hulls in linseed oilcake. Various methods based on ash determinations were unsuitable. Methods are described.

35. CHANDRA, K., and JOHRI, P. N. Rice husk as cattle feed. (Abs.) Indian Sci. Cong. Proc. 40(3):252. 1953,pub.1954. 513 In22

Digestibility trials summarized.

*Not examined.

36. CHOKKANNA, N. G., and NARAYANAN, B. T. Activated carbon from paddy husk. Cur. Sci. [India] 6: 617. June 1938. 475 Sci23

Chem. Abs. 32:7684. 1938.

Paddy husk is suitable material for the manufacture of activated carbon by treatment with zinc chloride.

37. CHOWDHURY, J. K., CHAKRABORTY, K. M., and GHOSH, J. K. Preparation of activated carbon from rice-husk. I-II. Indian Chem. Soc. J. Indus. & News Ed. 10(1/2):40-46; 11(3):83-96., illus. Ref. 1947-1948. 385 In27A

Contents: Pt. 1, Activation by impregnation with boric acid, ammonium borate, and ammonium phosphate, Pt. 2, Activation by carbonising in various gas atmospheres and secondary gas activation.

Chem. Abs. 42:6473. 1948.

Brit. Abs. B-I 1949:556.

Available in huge volume in Bengal, rice husk should be a suitable raw material for manufacture of activated carbon. Methods are described.

38. CHOWDHURY, J. K., CHAKRAVARTY, K. M., and BHATTACHARYYA, A. K. Preparation of activated carbon from rice and betelnut husks. I-II. Indian Chem. Soc. J. Indus. & News Ed. 4:72-82. 1941. 385.8 In27A

Contents: Pt. 1, Activation with zinc chloride. Pt. 2, Activation with steam and carbon dioxide.

Chem. Abs. 36:248. 1942.

Yield of activated carbon was greater from rice hulls than from betelnut hulls. A mixture of carbon dioxide and steam gave a very satisfactory yield with an activity appreciably higher than the carbons obtained by other methods of activation.

39. *CLARK, T. F. Abrasives from agricultural residues. U. S. Pat. 2,733,138. Jan. 31, 1956.

Chem. Abs. 50:8158. 1956.

Grit material (including 26 percent rice hulls) as the sole abrasive present is bonded in a resin matrix and molded into wheels. It may also be applied to cloth or paper sheet material to form abrasive coatings on traveling belts.

40. CLARK, T. F. Agricultural residues in plastic. III. Evaluation of residue flours as fillers in thermosetting phenolics. Mod. Plastics 26(12):111-115, 164-165. Aug. 1949. 309.8 P69

Includes rice hulls.

Tables show flexural and tensile strength, hardness, specific gravity, resistance to impact, water absorption and cracking.

41. CLARK, T. F., and LATHROP, E. C. Dry grinding of agricultural residues; a new industrial enterprise. U. S. Bur. Agr. & Indus. Chem. AIC-336, 36 p., illus. Ref. Peoria, Ill., 1952. 1.932 A2Ag82

Comprehensive treatment of the commercially valuable properties of residues, (including rice hulls) the description and operation of mechanical processing equipment, plant location, layout, labor, management, fire protection, and quality control.

42. *COEN, E. Ricerca della lolla di riso nelle farinette da foraggio. Ann. Lab. Chim. Cent. delle Gabelle 7:105. 1914.

Chem. Abs. 9:2676. 1915; through Ann. di Chim. Appl. 3(11/12):372. 1915. 385 An7

Detection of rice husks in fodder-meal by determination of ash and by microscopic examination.

43. COLLIN, E. Le son de blé. Ses succédanés et ses falsifications. Ann. des. Falsif. 10(109/110):539-554. Nov./Dec. 1917. 389.8 An72

Chem. Abs. 12:2391-2392. 1918.

Microscopic study showed husks of cereals, including rice, as adulterants in wheat bran.

44. COMMISSION INTERNATIONALE DES INDUSTRIES AGRICOLES. Bibliographie sur les industries du riz. Comm. Internatl. des Indus. Agr. Bibliog. 2724, 31 p. June 6, 1956. 241 C733

A short section is on rice hulls, and one is on rice straw.

The list covers 1946-55 and contains 293 items.

45. CONSERVATION Service approves hulls in seeding. Rice J. 54(12):8-9. Dec. 1951. 59.8 R36

Hulls help to achieve uniform distribution of seeds regardless of their size, shape, or weight.

46. CRAIG, J. A., and MARSHALL, F. R. Experiments in steer feeding. Tex. Agr. Expt. Sta. B. 76, 23 p. 1904. 100 T31S

Rice hulls, p. 10-11. Results show that rice hulls have practically no value for steer feeding.

47. CRUSE, J. T. Feeding experiments with steers and hogs. Tex. Agr. Expt. Sta. B. 135, 25 p., illus. 1911. 100 T31S

Ground rough red rice in the rations was found to be economical in certain combinations.

48. CRUZ, A. O., and WEST, A. P. Decolorizing carbon and sodium silicate from Philippine carbonaceous rice-hull ash. Philippine J. Sci. 70:143-156. Oct. 1939. 475 P53

Chem. Abs. 34:2143. 1940.

A method of making in one process both decolorizing carbon and sodium silicate from carbonaceous ash obtained by burning rice hulls.

49. DALRYMPLE, W. H. Rough rice as feed for horses and mules. La. Agr. Expt. Sta. B. 122, 8 p. 1910. 100 L93

Rough rice when ground, and forming one of the ingredients of a mixed ration, may be fed with safety and benefit to horses or mules.

50. DOMINQUEZ, A. G. Aprovechamiento de la cáscara del arroz en grano. Fomento 1(10):12,16. Aug. 1944. 8 F734

Uses of rice hulls.

51. DUCKWORTH, J., and DENT, J. M. The preparation of refined rice bran. Rice J. 49(5):15-17, 20, 28. May 1946. 59.8 R36

Hull fractions in the bran lowers the feeding value of rice offals and may produce detrimental effects in the alimentary tract.

52. DUFFEY, H. R., and WELLS, P. A. Economics of furfural production. Indus. & Engin. Chem. 47(7): 1408-1411. July 1955. 381 J825

Chem. Abs. 49:15122. 1955.

Rice hulls mentioned as possible raw material.

53. DUNLOP, A. P. Furfural formation and behavior. Indus. & Engin. Chem. 40(2):204-209. Feb. 1948. 381 J825

Chem. Abs. 42:4564. 1948.

Rice hulls are one of the major sources of furfural in Table 1. Potential furfural on a dry basis from hulls is shown as 12-13 percent.

54. DYER, A. J., and WEAVER, L. A. Corn substitutes for fattening cattle. Mo. Agr. Expt. Sta. B. 641, 12 p. 1955. 100 M693

Rough rice vs. corn, p. 11-12.

There were no objectionable features to feeding rice, but rough, ground rice was worth about 75 percent as much per pound as shelled corn.

55. ESTIENNE, V. Recherche et dosage de la "Balle de Riz" dans le son de froment. Agricultura 36(2):91-103. May 1933. 13 R32

Chem. Abs. 27:5430. 1933.

Investigation and determination of rice hulls in wheat bran. Details are given for three methods.

56. FIEGER, E. A., CHOPPIN, A. R., and TUCKER, P. W. Making use of rice hulls. I-III. Rice J. 50(9):9-12, 24-25; (10):16-24; (11):22-26, 34-35. Sept.-Nov. 1947. Ref. 59.8 R36

Reviews the following uses: In destructive distillation; as source of cellulose pulp; for activated (decolorizing) carbon; hydrolysis; as cattlefeed and edible cereal cellulose; for oxalic acid; in solutions for cleaning and scouring; in roasting of Philippine low-grade cromite for the production of sodium dichromate; in brick or potters clay; for dihydroxyquinolinecarboxylic acid (the B-acid of Suzuki); as a fertilizer; as a fuel and source of producer gas; as an insulating material. The experimental work relates to use in insulating material. The following determinations were made upon rice hulls: Density, heat value, fire retardance, and thermal conductivity or insulating value.

57. FIELDING, W. L., and PARKINSON, S. T. Photography as a help in the examination of cattle foods. I-II. Wye, Kent, So.-East. Agr. Col. J. 25:155-165; 26: 47-66. 1928-1929. 103 W97J

Chem. Abs. 24:3575. 1930.

Directions for microscopical identification. Rice chaff [i.e. husks] p.58-60.

*Not examined.

58. FONTILLAS, S. M. Determination of furfural from some farm by-products. Philippine Agr. 30:300-313. Sept.1941. Ref. p. 308-309. 25 P542
Chem. Abs. 36:2347. 1942.
From rice hulls mixed with broken kernels, 17.05 percent; whole rice hulls, 13.79 percent; rice straw with rachis, 16.58 percent.

59. FRAPS, G. S. The composition of rice and its by-products. Tex. Agr. Expt. Sta. B. 191,41 p. 1916. 100 T31S
Chem. Abs. 11:3346-3347. 1917.
Stone bran (includes hulls), p. 20-23; rice hulls, p. 26-27; rice hull ashes, p. 38-40.
Hulls are reported as having very low feed value, but as not being injurious to animals.

60. FRAPS, G. S. The composition of rice by-products. Tex. Agr. Expt. Sta. B. 73,14 p. 1904. 100 T31S
Rice hulls, p. 6-7. "Feeding rice hulls in large quantity is attended with some danger."

61. FRENCH, J. S. A market for rice hulls. Industry buys waste hulls to produce a vital chemical useful in 2000 ways. Rice News 15(2):4-5,20-22. Feb.1948. 59.8 R362
On the manufacture of furfural, and its uses.

62. FRENCH, J. S. Nylon hose from rice hulls. Rice News 17(2):4. Feb.1950. 59.8 R362
Furfural made from agricultural wastes for making nylon.

63. FRENCH, M. H. The value of rice byproducts for feeding to ruminants. Tanganyika. Dept. Vet. Sci. & Anim. Husb. Ann. Rpt. 1937:101-105. 1938. 41.9 T15
Chem. Abs. 33:1828-1829. 1939.
Rice hulls gave extremely low values.

64. FRENCH, M. H. The value of rice byproducts for pig feeding. Tanganyika. Dept. Vet. Sci. & Anim. Husb. Ann. Rpt. 1937:98-100. 1938. 41.9 T15
Chem. Abs. 33:1828-1829. 1939.

65. GAPUZ, R. B., MALVAR, A. B., and LEDESMA, M. R. Rice-hull brooder: its operation and efficiency. Araneta J. Agr. 2(4):1-11. July/Dec.1955. 25 Ar1
A homemade rice hull brooder was just as effective as an electric battery brooder in this test. It was easy to construct and hulls were more economical for heat than charcoal.

66. GIULIANI, R. La pula vergine di riso come succedaneo dell'avena nell'alimentazione dei cavalli. Minerva Agr. 9(9-10):98-103. May 1917. 16 M662
Chem. Abs. 12:1804. 1918. B. Agr. Intel. 8:1138-1139.
Rice husks as a substitute for oats in feeding of horses. Chemical analysis are given. Pula had no bad influence on health and could replace two-thirds of oats ration.

67. GOBERT, L. Fleurage de riz. Ann. des Falsif. 14(152):226-230. June 1921. 389.8 An72
Chem. Abs. 15:3346. 1921.
Rice husks have appeared on the French market under the name of "Rice Pollard." Its use as a stock feed is dangerous.

68. GT. BRIT. IMPERIAL INSTITUTE. Production and uses of rice. Gt. Brit. Imper. Inst. B. 15(2): 198-267. Apr./June 1917. 26 G79
Various uses of rice hulls are mentioned and their composition is given on p. 267.

69. HARDING, E. R. Cereal cellulose, a roughage material suitable for experimental animal diets. Science (n.s) 95:234. Feb.27,1942. 470 Sci2
Chem. Abs. 36:2949. 1942.
The cellulose derived from rice hulls shows the following percentage composition: nitrogen 0.043; ash 0.71; calcium 0.022; phosphorus nil; iron 0.001; aluminum 0.016; and silica 0.42.

70. HARDING, E. R. Properties and uses of an edible rice cellulose. Indus. & Engin. Chem. 20:310-311. Mar.1928. 381 J825
Chem. Abs. 22:1413. 1928.
Edible cellulose from rice hulls by cooking with soda, and subsequent hydration treatment. The product is cream color, mealy, odorless, and tasteless. One percent ash and high percentage of alpha- and hydrated celluloses. Dietary test indicated value. Used in manufacture of breakfast food.

71. *HITIZYO, K. Artificial slates. Jap. Pat. 128,357. Jan.18,1939.
Chem. Abs. 34:8116. 1940.
Hemp cloth is immersed in a gelatin solution at low temperature and dried. A paste of magnesium oxide, magnesium carbonate, ground rock, rice hull, magnesium chloride, gelatin solution, and a small amount of organic acids with or without pigments is coated on both sides of base material and pressed.

72. HONCAMP, F., and PFAFF, K. Untersuchungen über die Zusammensetzung und Verdaulichkeit von Reismehl, Reisspelzen und Reismehlen mit verschiedenen Reisspelzenzusätzen. Landwirt. Vers. Sta. 102:243-260. 1924. 105.8 L23
Chem. Abs. 19:1015. 1925.
Composition and digestibility of rice meal, rice husks, and rice meal with different proportions of rice husks.
A report of feeding experiments with sheep.

73. *HONDA, Y. Water-resistant pressed board. Jap. Pat. 2118('50), July 19,1950.
Chem. Abs. 46:8898. 1952.
Rice hulls or cork are used in this process.

74. *HORII, K. Utilization of pentosan. II-III. Hakko Kyokai Shi (J. Ferment. Assoc. Japan) 7:207-208, 278-280. 1949.
Chem. Abs. 47:4548. 1953.
Pt. 2, Production of pentose from pentosan. Pt. 3, Culture of yeast and bacillus in the pentose solution.
Rice straw and rice husks were not as good raw material as sawdust.

75. HOUGH, J. H., and BARR, H. T. Possible uses for waste rice hulls in building materials and other products. La. Agr. Expt. Sta. B. 507,36 p.,illus. 1956. 100 L93
Reviews the use of rice hulls and ash as fuel, fertilizer, supporting medium in hydroponic tanks, feed, insulating material, filler in plastics and refractory materials, in manufacture of furfural, as industrial cleaning agent, and in lightweight concrete blocks.
Describes research experiments in making a cement-rice-hull concrete and an adobe brick with rice hulls and ashes and Louisiana soils. The concrete was not stable or economical, but the bricks appeared to be successful.
The use of rice-hull ash as a substitute for diatomaceous earth is suggested if a processing method can be developed. The appendix deals with flameproofing rice hulls for use as a loose insulant.

76. HOUGH, J. H. Report on a lightweight building brick (L.S.U. Soilash) made from soil and rice hull ashes. La. Agr. Expt. Sta. Dept. Agr. Engin. Dept. C. 21,10+5 p. 1955. 58.9 L93
Abstract in Rice J. 59(2):39. Feb.1956.
Tests were made to determine whether clay soils could be mixed with rice-hull ashes instead of with sand before using the soil with emulsified asphalt to form a new type of adobe brick. Results were favorable with soils containing not more than 85 percent nor less than 40 percent clay, but bricks need to be tested under actual building conditions. The bricks were tested to determine their shielding properties against atomic fallout (beta and gamma rays) with good results. Economic factors in making the bricks are considered.

77. HOUGH, J. H. The use of rice hull ash and rice hulls as an aggregate for lightweight concrete. La. Agr. Expt. Sta. Dept. Agr. Engin. Dept. C. 15,11 p.,illus. 1953. 58.9 L93
Study on feasibility of using hulls and hull ash in building blocks. Compressive and tensile strength was safe but large cement content needed made costs high. The concrete is not recommended as a building material. It is neither stable nor economical.

78. HUGHES, E. H. Rice and rice byproducts as feeds for fattening swine. Calif. Agr. Expt. Sta. B. 420, 24 p. Ref. 1927. 100 C12S
Feeding values of rice and its byproducts as compared with barley. Whole rough rice was not economical. Finely ground was superior to coarsely ground rough rice.

79. *HUMBOLDT-DEUTZMOTOREN A.-G. Gas producer for using rice husks and similar vegetable wastes. German Pat. 592,608. Feb.10,1934. (Cl. 24e.5).
Chem. Abs. 28:3565. 1934.

*Not examined.

80. *HUMBOLDT-DEUTZMOTOREN A.-G. Gas producer for using vegetable wastes, e.g., rice husks, nut shells or shells of cacao, coffee or palm kernels. Brit. Pat. 392,498. May 18,1933.
Chem. Abs. 27:5520. 1933.

81. *ICHINO, K. Hydrolysis of fiber materials and their fermentation. VII-IX. Hakko Kyokai Shi (J. Ferment. Assoc. Japan) 7:155-161,208-211. 1949.
Chem. Abs. 47:2980-2981,5621. 1953.
Pts. 1-6, SEE item 133. Pt. 7, Utilization of fiber materials containing pentosan, p. 155-158. Pt. 8, Modified estimation method of the maximum reducing sugar of fiber materials containing pentosan, p. 158-161. Pt. 9, The improved measuring method of the maximum fermentable sugar in the fiber materials containing pentosan, p. 208-211.
Rice hulls were most profitably used for culturing yeasts on the pentosan extract and alcohol fermentation. Amount of sugar in the pentosan of rice hulls and rice straw was determined.

82. *ICHINO, K. Saccharification of cellulose materials and their fermentation. XII. Saccharification of cellulose with dilute and concentrated sulfuric acid. Hakko Kogaku Zasshi (J. Ferment. Technol.) 30:343-349. 1952.
Chem. Abs. 48:3682. 1954.
Luers' formula was not applicable for hydrolysis of hemicellulose from rice hulls.

83. *ICHINO, K. Saccharification of fibrous substances. Jap. Pat. 1279('50). Apr.18,1950.
Chem. Abs. 46:7769. 1952.
Rice hulls and rice straw were used.

84. ISSOGLIO, G. La composizione chimica dei cascami della lavorazione del riso. Nota II. R. Accad. delle Sci. Torino. Atti 54:980-991. 1919. U. S. Natl. Mus. Libr.
Chem. Abs. 14:1168. 1920. Cf. 13:622. 1919.
Chemical composition of the byproducts from the working up of rice showed the hulls to be rich in cellulose but poor in nutrition.

85. JACOBS, P. B. Destructive distillation of agricultural wastes. Indus. & Engin. Chem., Indus. Ed. 32:214-226. Feb.1940. Ref. 381 J825
Chem. Abs. 34:1840. 1940.
Product composition, yields, and uses of products of destructive distillation of lignocellulosic raw materials are discussed, as applied to rice hulls, etc.

85. JOACHIM, A. W. R., and KANDIAH, S. Chemical composition of some Ceylon paddies, rices and milling products. Trop. Agr. [Ceylon] 94(5):282-289. 1928. 26 T751
Chem. Abs. 23:1962. 1929.
Includes composition of paddy husk and bran.

87. JOACHIM, A. W. R., and KANDIAH, S. Chemical notes (17). - The analysis of some manures, fodders and feeding stuffs. Trop. Agr. [Ceylon] 94(5):282-289. May 1940. 26 T751
Chem. Abs. 35:263. 1941.
Six lines only, on paddy-husk ash, giving composition and price. It is of low manurial value.

88. JONES, J. D. New refractory from vegetable source. Canad. Metals 16(1):22-24. Jan.1953. U. S. Dept. Int. Libr.
Chem. Abs. 47:4056. 1953.
The name "Porosil" has been chosen and trademarked in Canada to describe the rice-hull ash and its products. Using rice-hull ash as a refractory, lightweight brick with good strength, good volume stability, and insulating power was produced. It did not require sawing to shape and correct dimension. The ash itself was highly refractory and a very efficient insulator.

89. JONES, J. D. Refractory insulators and porous media from vegetable sources. 1954. 5 p. 388 J712
Reprinted from Canad. Ceram. Soc. J. 23:99-103. 1954.
Rice hulls were calcined to produce ash of high silica content, porosity, and refractoriness in excess of 3000° F., with good insulating powers. A light-weight, insulating, highly-refractory brick for structural use was developed. "A ceramic bond of a modified alkaline-earth/silica type is the most practical."

*Not examined.

90. JONES, J. M., and others. Ground rice hulls in rations of fattening beef cattle. Tex. Agr. Expt. Sta. Ann. Rpt. 1938:126-127. 100 T31S
R. A. Hall, J. H. Jones, and E. M. Neal, joint authors.
Results indicated that rice hulls should not be used in cattle fattening rations.

91. JORDAN, E. L., and others. Feeding ground rough rice, etc. to horses, mules, hogs, and dairy cattle. A preliminary report. La. Agr. Expt. Sta. B. 179,8 p. 1921. 100 L93
A. F. Kidder, L. E. Long, and R. C. Calloway, joint authors.
No ill effect could be observed on the digestive organs of the animals as a result of feeding ground rough rice.

92. KARON, M. L., and ADAMS, M. E. Hygroscopic equilibrium of rice and rice fractions. Cereal Chem. 26(1):1-12,illus. Jan.1949. 59.8 C33
Chem. Abs. 43:2707
Moisture content of rice hulls at 25° C. and from 10 to 90 percent relative humidity was determined at 3.7 to 15.3 percent.

93. KATAYAMA, T. Über die quantitative Bestimmung von Reisspelzen in Futter- und Düngemitteln. Landw. Vers. Sta. 73:171-185. 1910. 105.8 L23
Abstracts in Expt. Sta. Rec. 24(4):310. 1911, and in Chem. Zentl. 81,II:834. 1910.
Quantitative determination of rice husks in feeds and fertilizers. Analysis of husks were made by different methods for ash, silicic acid, crude fiber, pentosans, and lignin. Results are shown in several tables.

94. *KAZITA, S., and INOUE, R. (to Sōyowa Sangyō K. K.) Artificial fibers from bran. Jap. Pat. 132,664. Oct.13,1939.
Chem. Abs. 35:3456. 1941.
Bran or hulls of rice treated with dilute alkali, proteins precipitated, washed, dissolved, stabilized, and extruded into a coagulating bath.

95. *KIHARA, Y. Chemical composition of rice. II. Composition of husk. Agr. Chem. Soc. Japan. J. 19(8):577-578. Aug.1943.
Chem. Abs. 43:1117. 1949.
Analyzed by Shikata-Fukuwatari method.

96. KIK, M. C. Effect of milling, processing, washing, cooking and storage on thiamine, riboflavin and niacin in rice. Ark. Agr. Expt. Sta. B. 458,60 p. 1945. 100 Ar42
Chem. Abs. 40:6697. 1946.
Tables on p. 14-15,17-18,34-35, give vitamin content for rice hulls.

97. KIK, M. C., and VAN LANDINGHAM, F. B. Influence of processing on the thiamin, riboflavin, and niacin content of rice.
Cereal Chem. 20:569-572. Sept.1943. 59.8 C33
Table II shows the distribution of B vitamins in rice hulls before and after conversion.

98. KIK, M. C., and VAN LANDINGHAM, F. B. Nicotinic acid in products of commercial rice milling and in rice varieties. Cereal Chem. 21:154-158. Mar. 1944. 59.8 C33
Chem. Abs. 38:4325. 1944.
Includes hulls.

99. KIK, M. C. Nicotinic acid (niacin) in rice. Rice J. 48(2):5,18-20. Feb.1945. 59.8 R36
Table shows niacin content of hulls.

100. KIK, M. C., and VAN LANDINGHAM, F. B. Riboflavin in products of commercial rice milling and thiamin and riboflavin in rice varieties. Cereal Chem. 20:563-569. Sept.1943. 59.8 C33
Chem. Abs. 38:170. 1944.
Includes hulls.

101. KIK, M. C. Thiamin in products of commercial rice milling. Cereal Chem. 20:103-109. Jan.1943. 59.8 C33
Chem. Abs. 37:1785. 1943.
Hulls contained I-II gamma thiamine per gm. of dry matter.

*Not examined.

102. *KITSUJO, K. Ferment activity in the hulls of rice. (From Journal of South Manchurian Medical Association, vol. 5, no. 3) (In Japanese?) Chuo Igakkai Zasshi (Cent. Med. Assoc. J.), 273:1148. Mar.5,1918.
Chem. Abs. 15:1338. 1921.
Abstract in Jap. Med. Lit. 5(5):30. 1920. U. S. Natl. Libr. Med.
Hulls facilitate growth of the acid-forming bacillus of fermentation.

103. KRISHAMURTHY, K., and RAO, M. N. Preparation of activated vegetable carbons for bleaching oils. Mysore. Cent. Food. Technol. Res. Inst. B. 4(9): 208-209. June 1955. 389.9 M99
The carbon obtained from paddy husk was the most efficient of four carbons for bleaching cottonseed oil.

104. *KRUPITSKAYA, L. S. An investigation of the factors which influence the swelling of Barkalite. (In Russian?) Nauch.-Issled. Lab. i Opytn. Sta. po Barkalaitu. Trudy 1:90-98. 1937.
Chem. Abs. 34:5962. 1940.
Russian (?) abstract in *Khim. Ref. Zhur. 6 p. 106-107. 1938.
Physical properties of Barkalite (a plastic) from rice hulls.

105. KUSUMA, T. A., and NURBUDI, K. D. Hatching duck eggs by means of ricehusks. (In Indonesian.) Hemera Zoa 60:91-101. Mar./Apr.1953. 41.8 V51
English summary.
Describes a method of incubating duck eggs without use of electric or other heat, except the eggs own heating within layers of rice husks at temperatures of 39-40° C.

106. LATHROP, E. C. Industrial utilization of rice hulls. Rice Ann. 1952:13-16,69-73. 59.24 R364
Tables show chemical analysis of rice hulls, digestible nutrients for feed, grinding to flour, use as filler in formaldehyde-phenol plastics, properties of glues made with residue flours, destructive distillation of hulls, physical properties of panelboards from ground residues, comparative analysis of rice hulls and some papermaking fibers, commercial yields of furfural from four residues.
Discussion on uses as feed, fuel, fertilizer, insulating material, as a filler, for production of charcoal, hard panelboard, cellulose pulps, furfural, sugars, solvents, liquid fuels. Concludes that research has proved to be sterile so far as practical utilization of hulls is concerned. Suggests the high ash content and abrasive character of hulls be further investigated.

107. LATHROP, E. C. New use for rice hulls. Rice J. 51(1):34. Jan.1948. 59.8 R36
"Soft grit" blasting with ground corncobs and rice hulls.

108. LAVA, V. G., and OLAYAO, I. Roasting of Philippine low-grade chromite for the production of sodium bichromate. Philippine J. Sci. 69:197-221. June 1939. Ref. 475 P53
Chem. Abs. 33:8932-8933. 1939.
Minus-20 mesh rice hulls roasted with 150 mesh chromite ore gave optimum water solution chromium.

109. LEHALLEUR, J. P. Emprego de diversos residuos de industrias brasileiras como adubos. Acad. Bras. Sci. Ann. 1:183-186. Dec.31,1929. U. S. Geol. Survey Libr.
Chem. Abs. 24:2824. 1930.
Use of industrial residues in Brazil for the fertilizer industry. The tables of analyses, showing compositions, include rice hulls.

110. LEON, A. I. DE, and REYES, R. O. Hydrolysis of some agricultural products. Philippine U. Nat. & Appl. Sci. B. 6:193-206. Oct.1938. Ref., p. 198-199. 475 P532
Chem. Abs. 33:2609. 1939.
From rice hulls: theoretical furfural, 9.05 percent; pentoses, 17.44 percent; pentosans, 15.34 percent; acetic acid, 0.92 percent; and formic acid, 0.44 percent.

*Not examined.

111. LEON, A. I. DE, and REYES, R. O. Studies on the utilization of some agricultural waste products. I. Destructive distillation of coconut shells, coconut husks, coconut rachis and petioles and rice hulls at 400° C. Philippine U. Nat. & Appl. Sci. B. 4:325-331. Dec. 1935. 475 P532
Chem. Abs. 30:4308. 1936.
Yield charcoal, tar, and pyroligneous acid. The charcoal as produced cannot be used as a decolorizing agent.

112. LINDSEY, J. B. The effect of sodium hydrate upon the digestibility of grain hulls. Science (n.s.) 55: 131-132. Feb.3,1922. 470 Sci2
Chem. Abs. 16:1471. 1922.
Dilute sodium hydroxide increases digestiblity of rice hulls for feed. Composition given.

113. LORENZ, K. P. Recovering fertilizer elements of molasses distillery slop. Sugar 45(1):36-37. Jan. 1950. 65.8 F11
Wastes from molasses, rum, and alcohol distilleries in Puerto Rico could be mixed with rice hulls (which are superior to bagasse as fillers) to make much needed fertilizers now being imported. Composition of rice hulls and fertilizer elements of distillery wastes are shown.

114. MCCALL, E. R., HOFFPAUIR, C. L., and SKAU, D. B. The chemical composition of rice. A literature review. U. S. Bur. Agr. Indus. Chem. AIC-312, 49 p. New Orleans,1951. 1.932 A2Ag82
A short section, p. 22-24, is devoted to rice hulls and straw.

115. MCDANIEL, R. Rice hulls for building materials. El Campo [Tex.] rice men perfect process to utilize hulls and ash in manufacturing superior building blocks and insulation. Rice J. 49(12):14-16. Dec.1946. 59.8 R36
Rice blocks (5x8x12 inches) can be cut easily with an ordinary handsaw, will take and hold a nail or screw, as well as lumber. They are completely fireproof, more pliable than concrete blocks, yet their tensile strength is materially higher. The material supplies almost total insulation powers. The blocks do not sweat and they will take a fine polish.

116. MCELHINNEY, T. R., BECKER, B. M., and JACOBS, P. B. Activated carbon from certain agricultural wastes. Iowa State Col. J. Sci. 16:227-239. Jan. 1942. Ref. 470 Io9
Chem. Abs. 36:4692-4693. 1942.
Activated carbons from rice hulls, produced on a laboratory scale, were substantially equal in quality to commercial carbons with which they were compared.

117. *MCGILL, H. T. (one-half to A. U. McGill). Rice-hull composition suitable for cleaning and scouring. U. S. Pat. 2,016,289. Oct.8,1935.
Chem. Abs. 29:8183. 1935.
Rice hulls are mixed with about 2-3 percent of a hydrocarbon oil or glycerol, which serves as an impregnating and toughening agent.

118. MANALO, P. S. Duck raising as a profitable enterprise. Philippine Isl. Dept. Agr. & Com. News B. 1(12):49-50. Feb.1947. 25 F533N
In "duckeries" an 8-inch layer of rice hulls is spread on the floor to protect the eggs and to facilitate cleaning. These rice hulls are removed when soiled and used as fertilizer.
Also in Philippine Livestock Mag. 1:44-45,73. Dec. 1947. 49 P53

119. MANALO, P. S. Duck raising in the Philippines. I-II. Philippine Livestock Mag. 1:199-200,215-216,222-224,229. Dec.1948. 49 P53
Rice hulls are firmly tamped in bottom of baskets and between them to serve as insulation and for retention of heat, and the baskets placed in homemade incubators to hatch duck eggs. The floor of the "hatchery" is covered with a layer of rice hulls 2-4 inches deep.

*Not examined.

120. MARCHADIER, and GOUJON. Recherche de la balle de riz dans le son de blé et évaluation des proportions de mélange. Ann. des Falsif. 17(189):328-332. July 1924. 389.8 An72

Chem. Abs. 18:3235. 1924.

Rapid method for the detection and determination of rice hulls in wheat bran is described.

121. MARCHADIER, and GOUJON. Recherche de la balle de riz dans le son de blé. II. Ann. des Falsif. 17(191):458-461. Nov.1924. 389.8 An72

Chem. Abs. 19:683. Feb.10,1925.

Detection of rice hulls in wheat bran. Method is described.

122. MARCUSSON, J., and PICARD, M. Die trockene Destillation von Reis- und Haverspelz. Chem. Ztg. 47:585. July 10,1923. 384 C427

Chem. Abs. 17:3243. 1923.

In the dry distillation of rice and oat hulls, rice hulls yield 8 percent oil, 33 percent aqueous distillate, 41 percent carbonaceous residue, and 20 percent gases.

123. MAROTTA, D., and CALO, A. Estrazione e composizione dei prodotti fosforati organici della pula di riso e dei panelli di semi oleosi. Ann. Chim. Appl. 22(12):763-776. Dec.1932. 385 An7

Chem. Abs. 27:2461. 1933.

The extraction and composition of the organic phosphorus compounds from rice husks and oilseed cakes. Includes analysis and composition of rice hulls.

124. MARTIN, J. I. The desilicification of rice hulls and a study of the products obtained. [Baton Rouge, La.] 1938. 34 p. Typewritten. La. State U. Libr.

Thesis (M.S.) - Louisiana State University.

"This work was undertaken in an effort to develop a process whereby rice hulls could be used for the preparation of sodium silicate, or some other form of silica, giving at the same time a desilicified product suitable for use as roughage in feeds," p. 1.

125. MATTALON, R. L'industrie rizière et ses produits. Egypte Agr. 43:131-139,165-173,199-206. July-Dec.1945; 44:1-6. Jan./Feb.1946. 24 Un32

Title varies.

Byproducts are discussed. The last two installments deal particularly with hulls, including composition and uses. Comment on these articles by J. M., Ibid. v. 46, p. 62-63. May/June 1948.

126. *MILLER, J. R., and EDWARDS, H. S. Filter for used lubricating oils. French Pat. 835,836. Jan.4, 1939.

Chem. Abs. 33:5175-5176. 1939.

The filtering element is composed of a mass of small balls formed of a mixture of fibrous material, e.g., cotton and rice hulls.

127. MIX RICE hulls with grass seed for uniform seeding from drill. Rice J. 52(5):26-27. May 1949. 59.8 R36

Reprinted from The Washington Farmer.

Planting instructions are given.

Discovered by an agronomist of the U. S. Soil Conservation Service at Pleasanton, Calif.

128. *MIYAMOTO, K. Activated carbon. Jap. Pat. 262('54). Jan.20,1954.

Chem. Abs. 48:13202. 1954.

From rice hulls.

129. *MORGENIER, R. Paper pulp from rice hulls. U. S. Pat. 1,570,389. Jan.19,1926.

Chem. Abs. 20:823. 1926.

Rice hulls are cooked in a 10° Baumé solution of sodium hydroxide for about two hours, separated from solution and beaten to pulp.

130. MULLER, H. J. De analyse van eenige afvalproducten der rijstpellerijen in Suriname. Indische Mercuur 58:593-594. Sept.25,1935. 286.8 In2

Chem. Abs. 29:8157. 1935.

Analyses of certain waste products of Suriname rice show that the hulls do not have the nutritive value of bran as feed.

131. MUTH, P. G. Louisiana - Rice bowl of the U. S. Crown 36(12):9-11,21. Dec.1947. 389.8 C88

Slight information on hulls. Lists several uses.

*Not examined.

132. NAGAOKA, Z., WATANABE, A., and YASIRO, Y. The heat conductivity of frozen moist insulator. Inst. Phys. & Chem. Res., Japan. Sci. Papers 34:1034-1041. Oct.1938. 513 T577

Chem. Abs. 33:1834-1835. 1939.

The waterproofing of rice hulls had little effect on their insulating value.

133. NAKAMURA, S., and ICHINO, K. Hydrolysis of fiber materials and their fermentation. I-VI. (In Japanese.) Hakko Kogaku Zasshi (J. Ferment. Technol.) 26:39-47,78-85,114-118,151-153. 1948.

Chem. Abs. 47:859,2980. 1953.

*Pt. 1-2, The hydrolysis of materials containing pentosan, p. 39-47.

Pt. 3-4, Fermentation of hydrolyzate containing pentose, p. 78-85. 390.08 H12

*Pt. 5, Hydrolysis of cellulose with concentrated sulfuric acid, p. 114-118.

Pt. 6, Hydrolysis of cellulose by concentrated hydrochloric acid, p. 151-153. 390.08 H12

Pt. 7-9, SEE item 81.

Rice hulls were used in these experiments.

134. NARASIMHAN, M. J., and MURTHY, B. K. Burnt paddy-husk for control of insects in stored food grains. Cur. Sci. 13:162. June 1944. 475 Sci23

Brit. Abs. B. III 1945:17.

A mixture of 1 gm. of the powdered material with 100 gm. of grain effectively controlled insects infesting jola, rice, wheat, and horse gram.

135. NATH, B. V. Symposium on the utilisation of waste products. Waste products of paddy and sugarcane crops. Madras Agr. J. 20:441-443. Nov.1932. 22 M262

Chem. Abs. 27:796-797. 1933. [no abstract].

Activated charcoal from paddy husk.

136. *NATRADZE, A. G. The investigation of the physical factors in the pressure reaction of Barkalite powder. (In Russian?) Nauch.-Issled. Lab. i Opytn. Sta. po Barkalaitu. Trudy 1937:61-79.

Chem. Abs. 33:6472. 1939.

Russian (?) abstract in *Khim. Ref. Zhur. 1(7):85-86. 1938.

Barkalite (thermoplastic resins) from rice hulls.

137. NELSON, G. H., TALLEY, L. E., and ARONOVSKY, S. I. Chemical composition of grain and seed hulls, nut shells, and fruit pits. Amer. Assoc. Cereal Chem. Trans. 8(1):58-68. Ref. Jan.1950. 59.9 Am3T

Rice hulls were included. Results shown in several tables.

138. NEUBAUER, H. Die Einschätzung des Spelzengehalts und Futterwerts der Müllereiabfälle von Getreidefrüchten, die mit den Spelzen zur Verarbeitung kommen. Landw. Vers. Sta. 94(1/2):8-40. Aug.1919. 105.8 L23

Chem. Abs. 14:786. 1920.

Estimation of husk content and feeding value of milling byproducts of cereals which come with the glumes on to the mill. Describes method for formulating equations for evaluating the mill refuse based on chemical analysis and digestive coefficients of various nutrients. Includes rice.

139. NEW INTEREST in use of rice hulls. Rice J. 55(9):28. Sept.1952. 59.8 R36

Reviews the need for finding uses for hulls.

140. NEW LIGHTWEIGHT building brick made from soil and rice hull ashes. Rice J. 58(10):12,14-15. Sept. 1955. 59.8 R36

Summary of report by J. H. Hough. Characteristics, uses, procedure in making, and costs of the bricks are given.

141. NOLAND, P. R., and FORD, B. F. For wintering steers .... rice hulls and rice mill feed. Ark. Farm Res. 3(3):8. Fall 1954. 100 Ar42F

Continuation of research previously reported. (SEE item 142)

Abstract in Rice J. 58(1);34. Jan.1955.

142. NOLAND, P. R., and GAINER, J. H. Use of rice hulls as a roughage for wintering steer calves and for gestating-lactating ewes. Ark. Agr. Expt. Sta. B. 538,12 p. 1953. 100 Ar42

Steers made slightly faster gains on praire hay than on rice hulls as 5 or 15 percent of roughage, and significantly slower gains on 50 percent rice hulls. Ewes lost less weight than those fed other mixtures.

*Not examined.

143. NOLAND, P. R. Utilization of rice by-products in animal feeding. Feedstuffs 25(43):56-58. Oct.24,1953. 286.81 F322

Included hulls as replacement for prairie hay in wintering steer calves, and wintering ewes. Fifteen percent replacement was satisfactory. No damage to tissues or organs was found in slaughtered animals.

144. OLD, A. N. Chemical composition of some rice byproducts. Agr. Gaz. N. S. Wales 51:27. Jan. 1940. 23 N472

Chem. Abs. 34:3834. 1940.

Analysis, for feed, of rice hulls and rice straw.

145. ONTARIO RESEARCH FOUNDATION. Annual report, 1955. Toronto, 1955. 35 p. 330.9 On8

Biochemistry, p. 7-8, contains a paragraph from which the following is quoted: "The production of humidifier plates from rice hull ash is now a commercial operation in Brantford, and large numbers are being shipped to the United States... the most serious problem in 1955 was to secure an adequate supply of rice hull ash in Canada and the United States," p. 8.

The Annual report for 1953 p. 7, states that the humidifier plates were produced in the Hamilton Porcelains Limited plant at Brantford. Also that the production and utilization of firebricks was being studied by a large manufacturer in the U. S.

The 1952 report states that porous plates made with rice-hull ash for use in air-conditioning units have been made on a commercial scale and many thousands of these units are now in successful operation.

146. ONTARIO RESEARCH FOUNDATION. From waste to product via research; a staff report. Canad. Chem. Processing 36(13):26-28. Dec.1952. 381 C16

Chemical analysis was made of rice-hull ash, and feasibility was shown of using the ash to produce a refractory, light weight brick with good strength, good volume stability, and insulating power, which did not require sawing to shape and dimension.

Ceramic humidifier plates with fine porosity and strong capillary action were developed for use in hot-air heating installations. "Porosil" was the trade-mark for them.

147. OPIANA, G. O. Glazing Philippine pottery ware. Philippine J. Sci. 76(3):29-36. Aug.1944. 475 P53

Chem. Abs. 41:4283. July 10,1947.

Rice-hull ash was a good source of silica for glazing pottery.

148. *PASCUAL, F., and others. Industrial utilization of rice by-products. VIII. The production of edible yeasts in Waldhoff fermenters using husk prehydrolyzates. Soc. Espan. Fís. y Quím. An. Ser. B. Quím. 49B:789-800. 1953. 385 So16

Chem. Abs. 48:10293. 1954.

A. Alcalá, A. Casas, and E. P. Yúfera, joint authors.

Culture media had five percent reducing sugars.

149. PELAGIO, H., and COSTA, N. DA. Insulating, packing or wrapping material. Brit. Pat. 505,278. May 9,1939.

Chem. Abs. 33:9491-9492. 1939.

The resulting product, comprising a base, such as rice hulls, may be rendered waterproof or noninflammable.

150. *PERL, J. Composition and production of building units. U. S. Pat. 2,504,579. Apr.18,1950.

Chem. Abs. 44:5560. 1950.

Cellulosic materials, including straw and rice hulls were combined with cement to form blocks, sheets and boards of light weight and good quality.

151. PETERSEN, H. M. Vore inporterede fodermidler: risfodermel- vallepulver. Landbonyt 9:580-581. Nov.1955. 11 L2322

Some imported rice feeds have contained 50-60 percent hulls which are so low in food value that it does not pay to import them.

152. *PICCOLI, E. Reduction of metallic oxides. Ital. Pat. 450,592. July 23,1949.

Chem. Abs. 45:528. 1951.

Examples are given of use of rice hulls as a carbon-containing material.

*Not examined.

153. PIROCCHI, A. La pula vergine di riso nell'alimentazione dei buoi da lavoro. La Clin. Vet. 40(14/15): 428-442. July 30-Aug.15,1917. 41.8 C61

Chem. Abs. 12:837. 1918. B. Agr. Intel. 8:1387-1389. 1917.

Rice husks in feeding draft oxen. Analysis is given. A saving was made by substituting 100 lbs. of pula for 200 lbs. of hay.

154. *POSSENTI, A. Gasification plant for rice hulls in the gas plant of Vercelli. Risicoltura 30:243-251. Dec.1941.

Chem. Abs. 37:3247. 1943.

Abstract in Chem. Zentbl. 113(I):2614. May 20,1942. 384 C42

Gasification produces a gas with 1586 calories and a tar with 4943 calories. The gas is blended with coal gas.

155. PRICE, S. A. Vitamin B-complex content of the commercial milling products of Egyptian rice. Cereal Chem. 23:318-321. Ref. May 1946. 59.8 C33

Chem. Abs. 40:4811. 1946.

Nicotinic acid, pyridoxine, and riboflavin in Egyptian milling fractions, including hulls, were similiar to those grown in the U. S.

156. *PUTTAERT, J. F., and PUTTAERT, H. F. J. Fibrous pulp from rice hulls. U. S. Pat. 1,588,335. June 8,1926.

Chem. Abs. 20:2584. 1926.

Sodium hydroxide cook.

157. RAMAKRISHNAN, T., and VENKATRAMANAN, K. A new interfering agent in Sanchis' test for fluorine. Indian Chem. Soc. J. 30(2):139-142. Feb.1953. 385 In27

Chem. Abs. 47:10405. 1953.

Saccharic acid present in paddy husk carbon was the interfering agent.

158. *RAMAMURTI, K. Preparation of d-xylose from agricultural wastes to serve as starting material in the synthesis of d-ascorbic acid. Rajasthan Acad. Sci. Proc. 1:14-16. July 1950.

Chem. Abs. 46:908. 1952.

Rice husks and paddy straw were among wastes used. d-Xylose content was determined for each.

159. RAMZIN, L. K. Combustion of fuel fines in state of suspension. World Power Conf., 2d, Berlin, 1930. Trans. 7:171-186. Libr. Cong.

Chem. Abs. 25:4684-4685. 1931.

Germany summary.

Results of combustion tests on rice hulls and other substances. Use of rice hulls as fuel of fine granulation.

160. *RANKIN, F. J. Oxalic acid. U. S. Pat. 1,520,885. Dec.30,1925.

Chem. Abs. 19:657. 1925.

Rice hulls were oxidixed to form oxalic acid.

161. RAO, A. N., and RAO, S. N. G. Activated carbons from bagasse and other Indian raw materials. Indian Chem. Soc. J. Indus. & News Ed. 2:161-170. 1939. 385 In27A

Chem. Abs. 34:4239-4240. 1940.

Carbon made from rice hulls, among other materials, had marked decolorizing properties toward caramel solutions and such other coloring and colloidal matter that may be present in sugar liquors.

162. RAUNIER, C., and PAU, H. Recherche et différenciation de la balle de riz et de la sciure de bois dans les sons et repasses. Ann. des Falsif. 23(256): 229-233. Apr.1930. 389.8 An72

Chem. Abs. 24:4095. 1930.

Detection and differentiation of rice hulls and sawdust in bran and middlings. Method is described.

163. RAY, M. L. Rice mill feed. Ark. Farm Res. 4(4):3. Winter 1955. 100 Ar42F

Made up of 60 percent rice hulls, 35 percent bran and 4 percent polish, and fed to steers as sole roughage in winter rations, it was the most economical roughage studied.

Also in Rice J. 60(2):37. Feb.1957. 59.8 R36

Reprinted with title "Indicate rice byproducts good for steer wintering rations" in Flour & Feed 57(2):3,21, Feb.1956. 298.8 F66

*Not examined.

164. REED, J. B., and LIEPSNER, F. W. The byproducts of rice milling. U. S. D. A. B. 570, 16 p. 1917. 1 Ag84B
Chem. Abs. 11:3346. 1917.
Analysis of byproducts of milling including rice hulls.

165. *REISER, H. Clay products suitable for light bricks, etc. U. S. Pat. 1,945,232, Jan.30,1934.
Chem. Abs. 28:2490. 1934.
The residuum obtained by burning rice hulls (suitably in a proportion of about 20-80 percent) is mixed with brick or potters clay.

166. RICE comes to rescue of oil industry. World Rice 2(2):7. Feb.1955. New Orleans Br. Libr.
Use of rice hulls and flax straw [combined into a product called Fiber-Seal] as a sealing agent in oil-drilling mud, as it has no effect on the chemical properties of the mud.

167. RICE GROWERS ASSOCIATION OF CALIFORNIA. [Announcement.] Indus. & Engin. Chem., Indus. Ed. 36:868. Sept.1944. 381 J825
The above journal's "August's Headlines" for August 23 announces that the Association "will construct by-products plant to convert rice hulls into alcohol, glucose, wallboard, lignin, and a filler for plastics." -Entire item.

168. RICE hull carbon tested at Audubon Park Experiment Station. La. Planter 59(1):11. July 7,1917. 65.8 L93
Carbonized rice hulls used as a decolorizing agent for sugar sirup.

169. RICE hulls used in experiment. Rice J. 56(10): 21. Oct.1953. 59.8 R36
News report of an experiment at the College of Agriculture, University of Arkansas, wherein rice hulls were successfully used as partial replacement for roughage in cattle feeding.

170. RICHARDSON, E. C., EPPS, E. A., and WATTS, A. B. A look at uses for rice hulls. Used for energy studies on broilers. Rice J. 59(4):28-29. Apr.1956. 59.8 R36
Two experiments to determine the effects of fiber on gain and feed efficiency.

171. ROA URIARTE, E. Impresiones de viajes III. Experimentos realizados con la cascara del arroz como aislante suelte. Agronomía 6(11):1-7. Nov.1946. 8 C893
Rice hulls used as loose insulating material, based on experiences in Louisiana.

172. *ROGERS, A. B. C. Preparing alcohol. Brit. Pat. 144,079. May 27,1919.
Chem. Abs. 14:2963. 1920.
Alcohol from rice hulls and straw.

173. ROMANA, C. O. S. Rice hull gas producer and engine. Sugar News 22:347-348. Oct.1941. 65.8 Su36
Chem. Abs. 36:1164. 1942.
This gas can be used in a modified gasoline or alcohol-type engine.

174. RUSOFF, L. L., FRYE, J. B., and EPPS, E. A. A look at uses for rice hulls. Hulls fed to cattle produce no ill effects. Rice J. 59(4):28. Apr.1956. 59.8 R36
Finely-ground rice hulls were found to be safe to use in cattlefeeds, but were of very low feeding value.

175. *SAKAI, T. Beerlike beverage. Jap. Pat. 5296 ('51). Sept.15,1951.
Chem. Abs. 47:2934. Mar.25,1953.
From rice or wheat hulls.

176. *SAKURAI, Y., and KATÔ, Y. Nutritive value of fibrous materials. II. Nôgaku (Agr. Sci.) 1:185-187. 1947.
Chem. Abs. 44:2612. 1950.
Outer hulls, and rice straw were almost valueless.

177. SAMANIEGO, R., and LEON, A. I. DE. Activated carbon from some agricultural waste products. Philippine Agr. 29:275-295. Sept.1940. Ref., p.294. 25 P542
Chem. Abs. 35:599. 1941.
Yield from rice hulls was 57.48 percent raw carbon.

178. *SAMEC, M., FERLAN, F., and PAJK, A. The hydrolysis of rice hulls. Akad. Znanosti in Umetnosti, Lubljani, Kem. Lab. Kem. Studije 1947:52-75. 1947.
Chem. Abs. 42:4378. 1948.
Dried hulls were soaked and hydrolized to yield reducing sugars which had agreeable taste and the smell of caramel.

*Not examined.

179. *SCHMIDT, K. Gas producer construction for gasifying rice hulls, etc. Brit. Pat. 325,616. Dec.5, 1928.
Chem. Abs. 24:4140. 1930.

180. SCHNELLER, M. A. The vegetable decolorizing carbons. La. Planter 59(10):154-156. Sept.8,1917. 65.8 L93
Includes remarks on cost of producing decolorizing carbon from rice hulls or leaves.

181. SCOTT, K. W., and STEPHENSON, E. L. The utilization and digestibility of rough rice by swine. (Abs.) J. Anim. Sci. 15:1228. Nov.1956. 49 J82
Rough rice gave gains equal to or superior to corn.

182. SCURTI, F. I cereali e le industrie chimico-agricole che essi alimentano. Cong. Naz. di Chim. Pura ed Appl., 2, Palermo,1926. Atti 1:317-326. 1927. 388 C763
Chem. Abs. 22:4665. 1928.
Rice hulls, among other substances contribute to some of the agricultural-chemical industries dependent upon cereals. Experiments show that rice hulls are composed of about 50 percent cellulose and 20 percent pentosans. Distillation with 30 percent sulfuric acid yields 4-5 percent furfural, 11 percent acetic acid and 65 percent of a carbonaceous residue suitable for fuel. With the conversion of the cellulose into ethanol and the hemicellulose into furfural, rice hulls should offer the means of a profitable industry.

183. SCURTI, F., and ZAY, C. E. Distillazione della lolla di riso con acidi condensanti per la preparazione di solventi dell'acetilcellulosa. Staz. Sper. Agr. Ital. 52:278-290. 1919. 105.4 St2
Chem. Abs. 14:3673. 1920.
Abstract in Soc. Chem. Indus. J. 39:441A. June 30, 1920. 382 M31
Distillation of rice hulls with condensing acids for the preparation of solvents of cellulose acetate. One kg. furnishes 40 gm. furfural and 110 gm. sodium acetate.

184. *SHARARA, M. M. Bauelement. German Pat. (D.B.P.) 898,272. Kl. vom 17/8. 1951, ausg. Nov.30, 1953.
Chem. Zentbl. 125:3309-3310. Apr.14,1954.
Rice hulls used in structural material.

185. *SHILSTONE, H. M. Decolorizing carbon. U. S. Pat. 1,556,039. Oct.6,1925.
Chem. Abs. 19:3571. 1925.
Fibrous rice material such as hulls, straw or chaff yields a product free from resinous materials.

186. SHILSTONE, H. M. Decolorizing sugar liquors with Carbrox, a carbon prepared from fibrous rice materials. La. Planter 58:364-365. June 9,1917. 65.8 L93
Chem. Abs. 11:3459. 1917.
Description of a decolorizing substance from rice hulls.

187. SHOFFELMAYER, V. Rice wastes tested as new chemurgic materials; California makes wallboard from hulls now burned. Tex. Chemurg. News 4(4):1-2. Oct.1,1948. 381 T29
News of research on waste hulls.

188. SILBERBERG, B. H. Microscopic method for the quantitative determination of rice hulls in rice bran. Assoc. Off. Agr. Chem. J. 6(1):71-72. Aug.15,1922. 381 As7
Chem. Abs. 17:1514. 1923.
Table compares results of microscopic method with estimates based on crude fiber analysis.

189. SILBERBERG, B. H. Report on stock feed adulteration. Assoc. Off. Agr. Chem. J. 5(1):77-78. Aug.15,1921. 381 As7
Chem. Abs. 16:597. 1922.
A method for the quantitative microscopic determination of rice hulls in rice bran is explained and recommended for adoption.

190. SMITH, R. M. The use of rice and rice byproducts in the laying ration. Ark. Agr. Expt. Sta. B. 478,30 p., illus. 1948. 100 Ar42
Whole rough rice and ground rough rice were satisfactory substitutes for yellow corn to the extent of 75 percent and 35 percent respectively when ration was adequate in vitamin A. Mortality was not influenced by the rations used.

*Not examined.

191. *SOLOVEĬCHIK, I. Y. Food concentrate containing B complex. U.S.S.R. Pat. 65,874. Feb.28,1946.
Chem. Abs. 41:5232. 1947.
Rice hulls and rice bran used.

192. SOUTHWORTH, W. L. Rice hulls for seeding. Soil Conserv. 14:280-282. July 1949. 1.6 So3S
Method developed by O. R. Hoglund using two bushels of hulls per acre for uniform distribution of grass seed mixtures.

193. SPENCER, K., and WILLIAMS, R. F. Studies in soil fertility with special reference to organic manures. I-III. Austral. J. Agr. Res. 5:181-234. Apr. 1954. 23 Au783
Chem. Abs. 48:8460. 1954.
Contents: Pt. 1, Field experiments, by K. Spencer; Pt. 2, Plant growth and nutrition in the field, by R. F. Williams; Pt. 3, Residual effects of the organic matter, by R. F. Williams, and K. Spencer.
Pea trash, rice hulls, chaffed lucerne and rice straw were the organic manures used. Pretreatment of soils with rice hulls gave significantly higher yields, but also delayed seedling emergence and retarded early growth.

194. *STEFANO, F. DI, and MUNTONI, F. Ricerca e dosaggio del pulone di riso nella crusca mediante una determinatione rapida della silice. Ann. di Chim. Appl. 30(12):525-533. Dec.1940. 385 An7
Chem. Abs. 35:2618. 1941.
Detection and determination of rice husk in bran, by rapid silica determination.
Silica in rice hulls was 18 percent.

195. *SUMIKI, Y. Levulinic acid. Jap. Pat. 176,438. June 30,1948.
Chem. Abs. 45:7589. 1951.
Rice hulls and rice straw were used.

196. SUMIKI, Y., and KOJIMA, A. Preparation of levulinic acid and its utilization. I. Levulinic acid from agricultural produce waste. (In Japanese.) Agr. Chem. Soc. Japan. J. 20(12):651-652. Dec.1944. 385 Ag8
Chem. Abs. 42:5422. 1948.
Rice hulls and rice straw were two of the residues used.

197. *SUZUKI, Z. Sulfur dye from rice hulls. U. S. Pat. 1,244,795. Oct.30,1917.
Chem. Abs. 12:228. 1918.
The dye produced made cotton dark brown.

198. TAGGART, W. C. Vegetable carbons for use in white sugar manufacture and in refining. La. Planter 58(24):381. June 16,1917. 65.8 L93
The Louisiana Sugar Experiment Station discovered how to produce a decolorizing carbon from rice hulls, and a controversy over the patent developed.

199. *TAKEI, S., and MIYAJIMA, S. Control of injurious insects of stored rice. I. (In Japanese.) Oyo-Kontyu [J. Appl. Ent.] 3(2):78-83. 1941.
Chem. Abs. 44:5517. 1950.
U. S. D. A. Library has typewritten English abstract. 421 Oy6A
Rice-hull ash and coal ash had 100 percent killing power.

200. TOMEO, M., HERRERO, L., and ASTOR, M. I. Materias celulósicas nacionales. IX. Ensayos de ennoblecimiento: retama y cascarilla de arroz. (Abs.) Chim. & Indus. 74(4A):171. Oct.1955. 383 C42
Short abstract of paper given at 28th International Congress of Industrial Chemistry, Madrid, Oct. 1955.
Rice hulls were not usable because of poor yields and bad quality of cellulose obtained.

201. *TUCKER, P. W. A study of the physical and chemical properties of rice hulls. [Baton Rouge, La., 1944] typewritten. La. State U. Libr.
Theses (M.S.) - Louisiana State University.
Deals with flameproofing of rice hulls. Density, heat value, fire retardance, and thermal conductivity or insulating value were determined.

202. U. S. WESTERN REGIONAL RESEARCH LABORATORY. Conference on rice research. Report of proceedings. Albany, Calif., 1949-1950. 2 v. A59.9 W52
Abstract in Rice J. 52(3-4):17-19; (4):18. Mar.-Apr. 1949. 59.8 R36
Utilization of rice byproducts, by A. B. Court, p. 3-4. Utilization of rice hulls, by F. P. Griffiths, p. 7. Rice research needs, by L. C. Carter, p. 4-6. v. 2.

*Not examined.

203. VAN VEEN, A. G. Rijstzemel als bij-en noodvoeding. Geneesk. Tijdschr. v. Nederland.-Indië 81: 1182-1193. June 3,1941. U. S. Natl. Libr. Med.
Chem. Abs. 37:1785-1786. 1943.
Rice bran as a supplemental food. Hulls are bitter.

204. VEZZANI, V., and RAIMONDI, R. I sottoprodotti dell'industria risiera con particolare riguardo al farinaccio di riso e al suo impiego nell'ingrassamento dei suini. Cong. Internatl. des Indus. Agr. 8th, Rap. 4:212-220. 1950. 388 C765
Chem. Abs. 48:2276. 1954.
The byproducts of the rice industry with special reference to the flour of a rice-polishing fraction and its use in fattening pigs.
"A diet level of 40 percent of rice husks seemed to be optimum." Note: "husks" may be bran, rather than rice hulls.

205. VIGUERA LOBO, J. M., CASAS CARRAMIÑANA, A., and PRIMO YÚFERA, E. Aprovechamiento industrial de los subproductos del arroz. II. La prehidrólisis de la cascarilla de arroz. Rev. Cien. Apl. 7:142-151. Mar./Apr.1953. 475 R324
Chem. Abs. 48:11780. 1954.
Brit. Abs. 1953 BIII:385.
Industrial utilization of rice byproducts. II. Prehydrolysis of rice hulls.
Results are summarized in 17 tables and 10 figures.

206. VIGUERA LOBO, J. M., CASAS CARRAMIÑANA A., and PRIMO YÚFERA, E. Aprovechamiento industrial de los subproductos del arroz. V. Aclimatacion de levaduras sobre caldos de prehidrolisis de cascarilla. Microbiol. Españ. 6:129-147. Apr./June 1953. 448.3 M583
Chem. Abs. 48:4767. 1954.
Industrial utilization of the byproducts of rice. V. Acclimatizing yeasts to grow on the hydrolysis liquids of the hull.
The object was to obtain a strain of yeast that could effectively utilize the reducing sugars, mostly pentoses set free by acid hydrolysis of rice hulls.

207. *VOLPATO, V. Preparing fiber from rice hulls, straw, and the like. French Pat. 484,762. Nov.6, 1917.
Chem. Abs. 12:1124. 1918.
Fiber freed from inorganic and glutinous matter.

208. WEAVER, L. A., and MOFFETT, H. G. Rough rice for fattening cattle, sheep, and hogs. Mo. Agr. Expt. Sta. B. 386, 15 p. Ref. 1937. 100 M693
Best results were obtained when rough rice was ground before feeding. Ground rough rice was about 70 percent as valuable as corn. It was palatable, but needed nearly twice as much protein supplement.

209. WEST, A. P., and CRUZ, A. O. Philippine rice-mill products with particular reference to the nutritive value and preservation of rice bran. Philippine J. Sci. 52:1-78. Ref. Sept.1933. 475 P53
Chem. Abs. 28:1418. 1934.
General summary with many footnote references. Includes hulls and straw.

210. *WIEDEMANN, H. Utilizing rice waste. Brit. Pat. 185,083. Dec.22,1921.
Chem. Abs. 17:189. 1923.
Waste subjected to dry distillation. Charcoal obtained is especially suitable for decolorizing and purifying purposes owing to its high content of silicic acid.

211. WILLIAMSON, R. V., and LATHROP, E. C. Agricultural residue flours as extenders in phenolic resin glues for plywoods. Mod. Plastics 27(2):111-112, 169,170,172,174. Oct.1949. 309.8 P69
Chem. Abs. 43:8737. 1949.
Rice hulls were of 1 of 13 residues evaluated and found to permit savings in resin.

212. WILLIAMSON, R. V., CLARK, T. F., and NAFFZIGER, T. R. Agricultural residues in plastics. II. Plasticizers and inorganic extenders in 25-percent phenolics. Mod. Plastics 23(6):177-180,220,222. Feb. 1946. 309.8 P69
Pt. 3, SEE item 40.
Includes rice-hull compounds.
Table I shows physical properties of agricultural-residue compounds.

*Not examined.

213. WILLIAMSON, R. V., and LATHROP, E. C. Hard board from agricultural residues. Mod. Plastics 28(8):126,128,130,187. Apr.1951. 309.8 P69
Chem. Abs. 45:4479. 1951.
Rice hulls were unsatisfactory in the "dry" production process.
Table I shows physical properties of panelboards made from rice hulls and other residues.

214. *WILLIAMSON, R. V., and CLARK, T. F. Lignocellulose, phenol-formaldehyde, and inorganic-filler molding composition. U. S. Pat. 2,502,498. Apr.4,1950.
Chem. Abs. 44:6678. 1950.
Rice hulls, peanut shells or wheat straw comprise the lignocellulose component, about 25 percent of the composition of molded articles.

215. *WILLIAMSON, R. V. Lignocellulose pressure-molded product. U. S. Pat. 2,645,587. July 14,1953.
Chem. Abs. 47:10280. 1953.
Rice hulls were used.

216. WINTER, O. B. The microscopic identification and determination of the specific ingredients in stock feeds. Mich. Agr. Expt. Sta. Spec. B. 120,31 p.,illus. 1923. 100 M58S
The adulteration of rice bran with rice hulls, p. 16.

217. YAMPOLSKY, C. Rice. II. Rice grain and its products. Wallerstein Lab. Commun. 7:7-26. Apr.1944. 390.9 W15
Chem. Abs. 39:2581. 1945.
Summary of vitamin B-complex in different milled fractions, including hulls in Tables 8 and 14.

218. YANOVSKY, E. Extraction of hemicelluloses from plant materials; quantitative study. Indus. & Engin. Chem., Indus. Ed. 31:95-100. Jan.1939. 381 J825
Chem. Abs. 33:1492. 1939.
Normal extraction curves obtained from rice hulls.

219. ZERBAN, F. W. More about rice hull carbon. La. Planter 59:93-94. Aug.11,1917. 65.8 L93
Chem. Abs. 11:3459. 1917.
This carbon removes 75-95 percent of the coloring matter found in various products by using only 1-3 percent carbon by weight.

220. ZERBAN, F. W., FREELAND, E. C., and SULLIVANT, D. D. Studies on the preparation of vegetable decolorizing carbons for the cane sugar industry. La. Agr. Expt. Sta. B. 167,44 p. 1919. 100 L93
Chem. Abs. 13:2295-2296. 1919.
Rice hulls were a very promising source of carbon.

RICE STRAW

See also Items 13 14 44 58 74 81 83 114 144 150 158 172 176 185 193 195 196 207 209

221. ACHARYA, C. N. Studies on the anaerobic decomposition of plant materials. I. The anaerobic decomposition of rice straw (Oryza sativa). Biochem. J. 29:528-541. Mar.1935. Ref. 382 B52
Chem. Abs. 29:5212. 1935.
Only 0.1 part or less of available nitrogen is necessary for anaerobic decomposition while 0.7 parts is required under aerobic conditions for 100 gm. of rice straw.

222. ACHARYA, C. N. Studies on the anaerobic decomposition of plant materials. II. Some factors influencing the anaerobic decomposition of rice straw (Oryza sativa). Biochem. J. 29:953-960. Apr.1935. Ref. 382 B52
Chem. Abs. 29:5583. 1935.
Optimum conditions for digestion of rice straw were pH 7.5-8,30-5^{o}, potassium bicarbonate, or ammonium carbonate to neutralize the acids formed and 10 parts of water to 1 part of straw.

223. ACHARYA, C. N. Studies on the anaerobic decomposition of plant materials. III. Comparison of the course of decomposition of rice straw under anaerobic, aerobic and partially aerobic conditions. Biochem. J. 29:1116-1120. May 1935. 382 B52
Chem. Abs. 29:5885. 1935.
The rates of decomposition under aerobic, water-logged, and anaerobic conditions decreased in that order.

224. ACHARYA, C. N. Studies on the anaerobic decomposition of plant materials. IV. The decomposition of plant substances of varying composition. Biochem. J. 29:1459-1467. June 1935. Ref. 382 B52
Chem. Abs. 29:6277. 1935.
The decomposition of rice straw was studied in reference to loss of constituents, products formed, and nitrogen transformations.

225. AHMAD, N., and KARNIK, N. G. A technical survey of cellulose-bearing materials of India. J. Sci. & Indus. Res. 2:275-290. June 1944. 475 J82
Chem. Abs. 39:184. 1945.
Investigation to determine alpha-cellulose content of rice straw under optimum conditions of kier boiling and bleaching.

226. AIYAR, S. P. Straw manuring in relation to amyitpo disease of rice. Indian Acad. Sci. Proc. 31B(3): 181-192,illus. Ref. Mar.1950. 513 In25B
Chem. Abs. 44:7476. 1950.
Straw fertilizing was harmful to the rice crop in Patheingyi soil as it gave rise to amyitpo disease due to potassium deficiency. Undecomposed rice straw was the most important contributory factor.

*Not examined.

227. AKAGI, K. Uber den alkalischen Aufschluss des Strohs durch Stuffenkochverfahren. (In Japanese.) Cellulose Indus. 15:59-60. Feb.1939. 309.8 C332
Chem. Abs. 34:2592. 1940.
German abstract in Abstracts from the Transactions, p. 11.
On the decomposition of straw with alkali through the multistage cooking process. Pulp from rice straw is described.

228. *AKAKI, M. Production of yeast from waste sources. IV-V. Production from rice straw hydrolyzate. Mié U. Facul. Agr. B. 8:78-92. 1954.
Chem. Abs. 49:14263. 1955.

229. *AKAKI, M. Utilization of waste sources by Neurospora sitophila. II-IV. Hakko Kogaku Zasshi (J. Ferment. Technol.) 29:322-325; 30:81-85,440-444. 1951-1952.
Chem. Abs. 48:2316,3449. 1954.
Neurospora sitophila was cultured in a medium prepared from hydrolyzates of rice hull, rice straw and other wastes.

230. *ALTARRIBA, J. C. Cellulose for paper manufacture from vegetable materials. Sp. Pat. 204,390. Feb.8,1954.
Chem. Abs. 49:7854. 1955.
Rice straw was one product used.

231. ANFT, P. Mineralizing organic fillers for light structural substances. Brit. Pat. 537,683. July 2,1941.
Chem. Abs. 36:2112. 1942.
The mineralized organic fillers, such as rice straw, unite with cement in such a way that a mass of great strength is formed.

232. *ARAKAWA, M., and AKAGI, K. The swelling value of rayon pulp. (In Japanese?) Rayon World [Osaka, Japan] 5(8):4-6. 1937.
Chem. Abs. 35:4949. 1941.
Pulp from rice plants has a very low swelling value and little practical value for rayon.

233. ARONOVSKY, S. I., NELSON, G. H., and LATHROP, E. C. Agricultural residue fibers for gas-mask filters. Paper Indus. & Paper World 29:1300-1303. Dec.1947. 302.8 P1923.
Chem. Abs. 42:995. 1948.
Gives yield and analysis of alpha pulps from rice and barley straw. Up to 40 percent can be used with wood or cotton alpha pulps.

*Not examined.

234. ARONOVSKY, S. I., NELSON, G. H., and LATHROP, E. C. Agricultural residue pulps - bleaching studies on straw pulps. Paper Trade J. 117(25):38-48. Dec.16,1943. Ref. 302.8 P196

Chem. Abs. 38:1359. 1944.

Rice straw pulp consumes less chlorine than other pulps bleached to the same brightness, possibly because of the high siliceous ash content.

235. ARONOVSKY, S. I., RHODES, A., and LATHROP, E. C. Agricultural residue pulps - comparison with typical wood pulps. Paper Trade J. 124(13):49-54. Mar.27,1947. 302.8 P196

Chem. Abs. 41:2892. 1947.

Compares beating and strength characteristics of five pulps, of which one is made from rice straw, with typical woodpulps.

236. ARONOVSKY, S. I. YOUNGER, J. O., and NELSON, G. H. Agricultural residue pulps for corrugating; effects of weathering and of various cooking conditions. Paper Trade J. 120(8):124,126,128,130,132. Feb.22,1945. 302.8 P196

Chem. Abs. 39:1985-1986. 1945.

Also in Paper Mill News 68(8):102,104,106,108,110. Feb.24,1945. 302.8 P195

Rice straw and other farm wastes for corrugated paper.

Eight residues were tested. Rice straw gave practically the same yield of pulp as wheat straw, but the pulp had lower strength properties.

237. ARONOVSKY, S. I. Manufacture of cellulose pulps from straw. Paper Indus. 32(6):628,650,652,654, 656-657. Sept.1950. 302.8 P1923

Chem. Abs. 44:10317. 1950.

Presented at eight International Congress of Agricultural Industries, July 1950, at Brussels, Belgium.

A recapitulation of work carried out at the U. S. Northern Regional Research Laboratory, Peoria, Ill. Estimated world production and availability in 1947 of cereal straws, including rice; chemical composition; collection and transportation; technology of pulping.

238. ARONOVSKY, S. I. The manufacture of straw pulp. Paper Indus. & Paper World 30(1-2):71-79,244-251. Apr.-May 1948. illus. Ref. 302.8 P1923.

Chem. Abs. 42:4746. 1948.

Brit. Abs. 1948 B. II:469.

A lecture on practicability of producing straw pulps, procurement of straw, and technical and process control in the strawboard industry. Includes rice straw.

240. AYYAR, K. S. V. Utilisation of farm wastes. Madras Agr. J. 20:437-438. Nov.1932. 22 M262

Chem. Abs. 27:796-797. 1933.

Part of a "Symposium on the utilisation of waste products" taking up among other things, the preparation of synthetic farmyard manure from paddy straw.

241. BANKS, H. Uses of Korean rice straw in bags, ropes and roofs. Soybean Digest 7(5):27. Mar.1947. 60.38 So9

About 22 million bags of plaited rice straw are made per year in Korea. No other bags or sacks are seen. Straw rope is good for one season and for fuel when worn. Roofs are thatched with straw and many small articles made of it.

242. BEDFORD, SIR C. H. Industrial (including power) alcohol. Roy. Soc. Arts. J. 69:471-482. June 10, 1921. 501 L847J

Discussion, p. 482-486.

Chem. Abs. 15:3179. 1921.

Plant being built in 1921 at Rangoon, India, for manufacture of power alcohol from rice straw.

243. BHASKARAN, T. R., and PILLAI, S. C. Loss of biologically fixed nitrogen from soils and its bearing on crop production. Science (n.s.) 90:595-596. Dec.22, 1939. 470 Sci2

Chem. Abs. 34:2514. 1940.

In the presence of rice straw, the loss of fixed nitrogen from the soil, after the addition of sugars and molasses, is prevented.

244. BHAT, R. V., and SINGH, M. M. Pulps for strawboards from wheat straw and rice straw. Indian Pulp & Paper 9:259-263. Nov.1954. 302.8 In23

Chem. Abs. 49:5835. 1955.

Yields of 60 percent were obtained, but wheat straw gave stronger pulp than did rice. Tables show composition of straw and digestion conditions and pulp yields. Rice husk was useless for making boards.

245. BROWN, P. B. The utilization of rice straw in wintering rations for cattle. Rice J. 58(13):16-17. Dec. 1955. 59.8 R36

The experimental rations used, their chemical analysis, and results of the feeding trials are shown in Tables 1-6.

246. BURGO, L. La cellulosa di paglia di riso realizzazioni delle Cartiere Burgo. Indus. della Carta 4(11): 429-430. Nov.1937. 302.8 In2

Abstract in Inst. Paper Chem. B. 8:220. Feb.1938. 302.9 L43

Cartiere Burgo Company developed a satisfactory process for cooking rice straw pulp. Economical harvesting and storing straw was a problem.

247. CARBERY, M., CHATTERJEE, I., and TALAPATRA, S. K. Studies on the mineral requirements of cattle in north-east India (with special reference to rice straw feeding). Indian J. Vet. Sci. 7:155-211. Sept.1937. 41.8 In22

Chem. Abs. 32:2578. 1938.

Rice straw is the main roughage for animals, and digestibility experiments were performed to show what mineral nutrients the straw supplied. Results are shown in detailed tables.

248. CHANG, H.-Y., HUNG, C.-C., and CHANG, Y.-K. Paper stock from plant stems. (In Chinese.) Indus. Center [Nanking] 3:212-214. July 1934. Calif. U. Libr.

Chem. Abs. 30:2754. 1936.

Method of obtaining pulp from rice straw.

249. CHATTERJEE, I., and TALAPATRA, S. K. The lime and phosphorus requirements of Bengal cattle. Agr. & Livestock India 8:559-562. Sept.1938. 22 Ag83A

Chem. Abs. 33:2563-2564. 1939.

Assimilation poor from rice straw.

250. CHATTERJEE, I., and HYE, M. A. The value of Aus paddy straw as a fodder. Agr. & Livestock India 8(4):361-366. July 1938. 22 Ag83A

Chem. Abs. 33:1830. 1939.

Aus paddy straw was richer in oil, protein, and minerals than Aman paddy straw, but neither would maintain the weight of cattle when it was the only constituent of the ration.

251. CHATTOPADHYAY, H., and SARKAR, P. B. New method for the estimation of cellulose, with special reference to jute. Natl. Inst. Sci. India. Proc. 12:23-46. Ref. Jan./Feb.1946. 513 N212

Chem. Abs. 42:4343. 1948.

The sodium chlorite method described was also applied successfully to paddy straw and sawdust.

252. CHEANEY, R. L., WYCHE, R. H., and FUDGE, J. F. Effect of fertilizers on the crude protein and phosphoric acid content of rice straw. Tex. Agr. Expt. Sta. Prog. Rpt. 1749,3 p. Feb.2,1955. 100 T31P

The straw samples were deficient in protein and phosphorus for beef cattle feeding.

253. CHIAPPELLI, R. Letame artificiale. Risicoltura 39:57-59. Mar.1951. 59.8 G43

Brit. Abs. B-III. Sept.1951:441.

Artificial compost. A mixture of humid rice straw and phosphorite, fermented over three to four months, gave an optimum artificial manure.

254. CHIAPPELLI, R. Sull' utilizzazione della paglia di riso come mangime al bestiame. Gior. di Risicolt. 10:131-137. Sept.30,1920. 59.8 G43

Chem. Abs. 16:3986-3987. 1922.

Abstract in Internatl. Rev. Sci. & Pract. Agr. [Rome] 11:1322-1323. Nov./Dec.1920. 241 In82

Analysis of rice straw used as cattle fodder.

255. *DARLING, E. R. Cellulose pulp from corn stalks, straw, etc. Brit. Pat. 314,061. June 22,1928.

Chem. Abs. 24:1219. 1930.

Description of preparation of pulp from materials such as rice hulls and straw.

*Not examined.

256. DESHPANDE, D. D. Power alcohol and paper from rice straw. Indian Inst. Sci. J. 13A:93-109. 1930. 513 In23
Chem. Abs. 24:4890. 1930.
The process gave 20-25 gal. of liquid fuel, mostly alcohol, and 8 cwt. of paper pulp from one ton of straw. Paper pulp was of good quality.

257. DUPONT, G., and ESCOURROU, R. Essais de cuisson de diverses matières cellulosiques. Chim. & Indus. [Paris] 47:470-474. Apr.1942. 383 C42
Chem. Abs. 37:6123. 1943.
Chem. Zentbl. 113:1648. Oct.7,1942.
Cooking experiments with various cellulosic materials, including water rice, (Zizania or wildrice) which can be pulped easily.

258. *EGUCHI, H., and SUZUKI, M. Manufacture of rice straw pulp for papermaking. Japan. Tech. Assoc. Pulp & Paper Indus. J. 3(4):11-20,55. July 1949.

259. ESPINO, R. B., and PANTALEON, F. T. Harmful effects upon young rice and maize plants of rice straw when added to clay loam soil in pots. Philippine Agr. 22:534-556. Ref. Jan,1934. 25 P542
Chem. Abs. 28:2829. 1934.
After the straw had decomposed 75 days in the soil, it proved beneficial. The chemistry underlying these effects is discussed at length.

260. *FALOMIR, E. W., GARCIA, J. M., and RODA, R. S. Organic fertilizers from vegetable residues. Sp. Pat. 216,642. Oct.27,1954.
Chem. Abs. 49:13572. 1955.
Process for transforming rice straw and other residues into fertilizer.

261. FELIZARDO, B. C. Effects of rice straw with varying amounts of available nitrogen on some physical and chemical properties of Lipa clay loam planted to rice. Phillipine Agr. 38:197-210. Ref. July/Aug.1954. 25 P542
Thesis (B.S.) — University of the Philippines.
The application of fresh rice straw tended to decrease the yields of both grain and straw.

262. FERRARI, V. Basi teoriche e possibilità pratiche di una industria italiana per lo struttamento chimico dei materiali legnosi. Chimica 15:531-538,illus. Aug. 1939. 385 C44
Chem. Abs. 34:4901. 1940.
Theoretical bases and practical possibilities of an Italian industry for the chemical utilization of ligneous matter, including rice straw. Outlines and charts are given.

263. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. Raw materials for more paper. Pulping processes and procedures recommended for testing. F. A. O. Forestry & Forest Prod. Study 6, 171 p. Rome,1953. 99.9 F73Fa
Condensation appeared in World's Paper Trade Rev. 140(10):691-692,694,696,698. Sept.3,1953. 302.8 W89
Considers world supplies, availablility, costs, processes of pulping, products. Characteristics of fibrous raw materials, including rice straw, p. 52; possible uses of straw pulp, p. 62; prices, p. 66; processes, p. 73-79 95-100; supplies of straw, p. 94; sampling, p.125-126; chemical examination, p. 133-135; pulping procedures, p. 145-150; pulp testing, p. 160.
Straw-pulp production has been hampered far more by difficulties of raw-material supply than for any technical reason.

264. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. References on the industrial utilization of rice by-products. Washington?1949. 20 p. 241.64 F73

265. *FUJII, S., and UEMURA, T Foods in hard times. VI. Food value of putrified straw. Agr. Chem. Soc. Japan. J. 24;239-241. 1951.
Chem. Abs. 45:6709. 1951.

266. G., P. Lacomposition de la paille. Papeterie 71(12):493,495. Dec.1949. U. S. Natl. Bur. Standards Libr.
Ash and cellulose contents of various straws, including rice, are discussed in relation to influence of growth conditions.

267. GALVEZ, N. L., and ROMERO, I. A. A study on the preparation of compost from rice straw. Philippine Agr. 29:753-765. Feb.1941. Ref., p. 763. 25 P542
Chem. Abs. 35:5236. 1941.

*Not examined.

268. GRANT, J. New horizons in the production of cellulose fibers for paper manufacture. Fibres 15(7): 223-226. July 1954. 304.8 F16
Chem. Abs. 49:9275. 1955.
Rice straw is mentioned as a possible source of cellulose fiber for paper.

269. GT. BRIT. IMPERIAL INSTITUTE. Utilisation of rice and its by-products. Gt. Brit. Imper. Inst. B. 16(1):16-24. Jan./Mar.1918. 26 G79
Chem. Abs. 12:2391. 1918.
Abstract in Soc. Chem. Indus. J. 37(19):601A. Oct.15, 1918. 382 M31 (SEE also item 384)
Rice straw for paper-making, p. 21-23. Rice husks, p. 23-24. The hulls produced a weak, brittle paper, but rice straw gave a good yield of pulp and a strong, opaque paper of excellent quality.

270. *HACHIHAMA, Y., JODAI, S., and SATŌ, H. Fundamental research on lignin. I. Action of nitric acid on the lignin of rice straw. Chem. Soc. Japan. J. Indus. Chem. Sect. 52:325-327. 1949.
Chem. Abs. 46:7324. 1952.

271. HACHIHAMA, Y., and TAKEMURA, W. Studies on the bagasse, XI-XII. (In Japanese.) Soc. Chem. Indus. Japan. J. 40:778-783. Oct.1937. 385 J82
XI. On the picric acid isolated from the waste acid of nitric acid pulping process. XII. On the bagasse pulp prepared by the nitric acid process (Supplement).
English abstract in Supplemental Binding, p. 354B-355B.
Chem. Abs. 32:1449. 1938. Cf. 31:2423-2424. 1937.
Products obtained from the nitric acid pulping process of rice straw.

272. HASEK, A. Výsledky pokusu so skrmavaním ryžovej slamy baranmi. Die Ergebnisse des Fütterungsversuchs mit Reisstroh bei Schafböcken. Pol'nohospodárstvo 2(2):143-150. 1955. 19.5 P75
Germany summary.
Compared rice straw with barley straw as feed for rams.

273. HAVIK, G. Untersuchungen einiger Rohstoffe für die Halbstoff- und Papierfabrikation auf Java. (Excerpts.) Papier Fabrik. 9:245-248,274-282. Mar.3-10, 1911. 302.8 P197
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Chem. Abs. 5:2942. 1911.
Abstract in Soc. Chem. Indus. J. 30:352. Mar.31,1911. 382 M31
Investigation of certain papermaking raw materials in Java gives comparison of yield and cost of production of paper from field and paddy straw.

274. HAYASHI, U., and NOMI, S. Studies on northwestern rice. (In Japanese.) Osaka Munic. Res. Inst. Dom. Sci. Rpt. 17(1):169-189. May 1946.
Chem. Abs. 41:4585. 1947.
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275. HOSOTUZI, I. Biochemical study on "beni" dyeing. (In Japanese.) Chem. Soc. Japan. J. 61:1275-1278. Dec.1940. 385 T57J
Chem. Abs. 37:3943-3944. 1943.
Dip silk in rice-straw ash solution and rice vinegar before dyeing. Serves as a mordant.

276. *INAOKA, M., and HIGASHI, T. Foods in hard times. V. Feeding experiments of albino rats with acid- and alkali-treated straw. Agr. Chem. Soc. Japan. J. 24: 144-146. 1951.
Chem. Abs. 45:6709. 1951.

277. INAOKA, M., and NAKAGÔ, Y. Foods in hard times. XII. Extraction and digestion of xylan. (In Japanese.) Agr. Chem. Soc. Japan J. 25(3):125-127. 1951. 385 Ag8
Chem. Abs. 46:10324. 1952.
German summary.
Xylan prepared from rice straw was fed to mice. It could be converted into glycogen, though only a small amount was eaten.

278. ISHII, K. Studies on the principal plant-fibres in Japan. (In Japanese.) Bot. Mag. [Tokyo] 35:(127)-(137). June 1921. 450 B651
Chem. Abs. 17:1892. 1923.
Abstract in Jap. J. Bot. 1:(4):. 1922. 450 J27
Constituents and dimensions of Japanese vegetable fibers including rice straw, which shows 38.31 percent cellulose.

*Not examined.

279. ITANO, A., and ARAKAWA, S. Some scientific consideration on the Itano process of composting. I. General description, nature of fermentation and sanitary significance. Ohara Inst. f. Landw. Forsch. Ber. 3:497-504. 1928. 107.6 Oh1

Chem. Abs. 22:3480-3481. 1928.

Gives the chemical composition of composts made from rice straw, barley straw, rice hulls, and weeds.

280. IWATA, H. On the disintegration of rice straw. Kyushu Imper. U. Dept. Agr. J. 1:217-240. May 25,1926. Ref. p. 236. 107.6 K995

Chem. Abs. 22:3002. 1928.

Abstract in Expt. Sta. Rec. 58:166. 1928. 1 Ex6R

As the lignin and chlorine decreased the starch value increased, but not proportionately.

281. IYER, A. V., and AYYAR, N. K. Mineral assimilation from two typical fodders. Indian J. Vet. Sci. & Anim. Husb. 4(2):108-113. June 1934. 41.8 In22

Chem. Abs. 28:6877. 1934.

Bullocks did not assimilate lime from rice straw.

282. JENTGEN, H. Neue Zellstoffe für die Kunstfaserindustrie. Jentgen's Kunstseide u. Zellwolle 24: 350-364. Aug.1942. U. S. Natl. Bur. Standards Libr.

Chem. Abs. 38:2818-2819. 1944.

Chem. Zentbl. 113:2222. Nov.11,1942.

New cellulose pulps, such as that from rice straw, for the rayon industry. Pulping methods developed in different countries and experiences with them are described.

283. KAGAWA, I., and KONDŌ, T. Comparative study on the nitrations of cellulose and xylan. (In Japanese.) Chem. Soc. Japan. J. Indus. Chem. Sect. 53(6): 247-249. Aug.1950. 385 T57Je

Chem. Abs. 46:10613. 1952.

Xylan was prepared from rice straw.

284. *KATSUMI, K. Rice straw pulp. Jap. Pat. 3902('50), Nov.9,1950.

Chem. Abs. 46:9844. 1942.

285. KEHAR, N. D. Improving straws by alkali, water or lime treatment. Indian Farming (n.s.) 2(11): 14-15,22. Feb.1953. 22 In283

Chem. Abs. 47:6573. 1953.

Paddy straw and wheat straw were treated to improve feeding value.

286. KEHAR, N. D., and MUKHERJEE, R. Studies on the biological value of proteins of some common feeds. II. Paddy and oat straws in combination with some common oil cakes. Indian J. Vet. Sci. 19:283-290. Ref. Dec.1949. 41.8 In22

Chem. Abs. 46:3128. 1952.

Digestibility and biological values were determined for bullocks and sheep. Paddy straw protein was considered to be of good quality.

287. KIMURA, T. Untersuchungen über Zellstoffe. XI-XIII. Mitteilung. Untersuchung über die Herstellung von Reis-Stroh-Zellstoff. III-V; Herstellung von Zellstoff durch Aufschliessen mit Natronlauge. I-II; Herstellung von Zellstoff durch Sulfit-Prozess. (In Japanese.) Cellulose Indus. 15:105-112. Mar.1939. 309.8 C332

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Chem. Abs. 34:2592. 1940.

Research on cellulose concerned with preparation of pulp from rice straw by cooking with alkali, and by the sulfite process. The most satisfactory cooking conditions are given. The sulfite process gives pulps with higher ash and lignin contents, but less pentosan, than the alkali process. Their strengths are low and prolonged treatment causes darkening.

288. KITA, G., NAGATA, S., and KIMURA, T. Reisstroh und seine Verwertung als Rohstoff für die Herstellung von Zellstoff. Papier-Fabrik., Tech.-Wiss. Teil 36:198-199. 1938. 302.8 P197

Chem. Abs. 32:6859. 1938.

Rice straw and its use as raw material in the production of pulp. Delignification with chlorine gas and dilute sodium hydroxide gave pulp yields of 48 percent of which 75.8 percent was cellulose. Some straw was delignified first.

*Not examined.

289. KOBO, K., and TAKAI, Y. Microbiological studies on the humification process. II-III. (In Japanese.) Agr. Chem. Soc. Japan. J. 27:477-483. Aug.1953. 385 Ag8

Chem. Abs. 49:16288. 1955.

English summary.

Pt. 2, On the aerobic decomposition of the fresh plant residues. Pt. 3, Absorption spectra of decomposition products.

Upland rice straw was decomposed with fungi and bacteria. Results are shown in several tables.

290. KOMATSU, S., and others. Studies on cellulose. I-III. (In Japanese.) Soc. Chem. Indus. Japan. J. 34: 1236-1238. Dec.1931. 385 J82

English abstracts in Supplemental Binding, p. 474B-476B.

Chem. Abs. 26:3372-3373. 1932.

I. Rice straw cellulose, 1, by S. Komatsu and Y. Yamana. Rice straw treated separately with (1) 3 percent sulfuric acid; (2) superheated water and (3) 7 percent sodium hydroxide solution gave yields of 37 percent, 32 percent, and 35 percent respectively.

II. Kaoliang cellulose, by S. Komatsu and M. Shimada. With and without pretreatment with water at 180° (cellulose prepared by Cross and Bevan method). Water pretreatment apparently results in conversion of alpha- to beta-cellulose.

III. Rice straw cellulose, 2, by S. Komatsu and Y. Kinoshita. Crude cellulose prepared by chlorination. Yield about 30 percent, properties similar to celluloses produced from ramie and wood.

291. KUBOTA, S., and OMORI, T. Studies on the old and the young polder soils developed along Kojima Bay. VI. Effect of rice straw upon formation of water-stable aggregates in the soil. (In Japanese.) Okayama. Agr. Expt. Sta. Spec. B. 55:57-74. Mar.1956. 107.6 Ok1R

English summary, p. 73.

Rice straw mixed in the dry soil in winter improved the structure of the soil.

292. KUMAGAWA, H., and SHIMOMURA, K. Zur Kenntnis der chemischen Zusammensetzung und Aufschliessbarkeit von Zuckerrohrabfall (bagasse) und Reisstroh. Ztschr. f. Angew. Chem. 36:414-418. Aug.8, 1923. 384 Z33

Chem. Abs. 17:3419. 1923.

Discusses the chemical composition and digestibility of bagasse and rice straw. Sodium hydroxide plus chlorine gave a pulp which could be bleached white. Rice straw fiber contained less cellulose, pentosans, and lignin, than bagasse fiber. The sulfite method yielded a white pulp, high in ash, but this did not affect its suitability for papermaking. With the sulfate process the yield was only 35-40 percent pulp, again high in ash. The silica seemed to act as a filler and a binder.

293. *KUNO, Y. Effect of drought on the chemical composition of rice straws. (In Japanese?) J. Sci. Soil & Manure 14:763-769. 1940. 56.8 J27

Chem. Abs. 35:1832. 1941.

294. KUNO, Y. The influence of climate upon the composition of rice straws. (In Japanese.) J. Sci. & Manure 11:123-132. Apr.1937. 56.8 J27

English abstract, p. 131.

Chem. Abs. 31:5088. 1937.

Chemical composition peculiarities resulting from unsuitable climatic conditions probably cause the frailty of the straw and thus the difficulty in working with it.

295. LANDER, P. E., and DHARMANI, P. L. C. Some digestibility trials of Indian feeding stuffs. VII. Kangra rice straw. Indian J. Vet. Sci. & Anim. Husb. 1(3):177-191,illus. Sept.1931. 41.8 In22

Chem. Abs. 27:787. 1933.

Analyses are tabulated. Rice straw from Kangra is deficient in protein, and digestibility figures are lower than for rice straw from other areas.

296. LATHROP, E. C. The characteristics of pulp fibers from agricultural residues. U. S. Bur. Agr. Indus. Chem. AIC-323, 12 p. Peoria, Ill.,1952. 1.932 A2Ag82

Residues from annual crops to supplement the short supply of softwood pulp fibers. Includes rice straw. Gives chemical and physical properties and methods for use in papermaking.

Also In Food & Agr. Organ. United Nations, FAO Forestry & Forest Prod. Study 3:143-154. Dec.1952. 99.9 F73Fa

*Not examined.

297. LATHROP, E. C. Industrial utilization of agricultural residues. TAPPI B. 59:1-2. Sept.24,1945. 302.8 T16
Summarizes work to be undertaken at Northern Regional Research Laboratory on agricultural residues including rice straw and rice hulls. Table shows annual production of residues 1931-35.
Also issued as U. S. Bur. Agr. Indus. Chem. AIC-141, Peoria,Ill.,1947. 2 p. 1.932 A2Ag82

298. LATHROP, E. C., and SHOLLENBERGER, J. H. Straw for industrial use; collection problems and quality. Tech. Assoc. Pulp & Paper Indus. Tech. Assoc. Papers 25:317-324,illus. June 1942. 302.9 T22
Chem. Abs. 36:4333. 1942.
Suitability, availability, and geographical location of cereal straws for industrial use are discussed. Map and table, p. 318, gives figures on rice straw.
Also in Paper Trade J. 114(20):46-53 [T. S. 234-241] May 14,1942. 302.8 P196

299. LAUER, K., and GHONEIM, A. F. M. Der alkalische Aufschluss von ägyptischem Reisstroh. Wchnbl. Paperfabrik. 80(7):211-214. Apr.15,1952. 302.8 W81
Abstract in Paper Indus. 34(3):390,392. June 1952. 302.8 P1923.
Chem. Abs. 46:5837. 1952.
Alkaline pulping of Egyptian rice straw. The soda process proved more satisfactory for pulping than the kraft process. Rice straw appears to be the most practical cellulosic raw material for use in the Egyptian pulp industry.

300. LONKAR, K. V., and RAO, S. N. G. Cane trash for card-board & wrapping papers manufacture. Indian Sugar 7:69. Feb.1944. 65.8 In25
Chem. Abs. 38:3838. 1944.
Cane trash makes stronger cardboard and wrapping paper than rice straw.

301. LOPEZ, D. R., and GOMEZ, L. Notes on the utilization of rice straw. Philippine U. Nat. & Appl. Sci. B. 6:103-107. Mar.1938. 475 P532
Chem. Abs. 32:8774. 1938.
Air-dry cellulose yield was 27.87 percent and final product contained 5.02 percent water; 1.41 percent ash; 78.43 percent alpha-cellulose and had a copper number of 1.15. Cellulose acetate was prepared from this pulp.

302. MAEDA, H. Physiochemical studies on the manufacturing process of artificial fibers. III. Crystalline and non-chrystalline regions of natural cellulose fibers. (In Japanese.) Soc. Textile & Cellulose Indus. (Japan) Zasshi (J.) 1(10):669-672. Dec.1945. 304.9 So12
Chem. Abs. 44:6116. 1950.
Pentosan was found in the crystalline part in rice-straw pulp.

303. *MAENO, S., and SANO, K. On the manufacture of rice straw pulp. (In Japanese.) Jap. Tech. Assoc. Pulp & Paper Indus. J. 4(4):1-10,87. Aug.1950.
Chem. Abs. 45:9860. 1951.
English summary, p. 87.
Bleachable pulp was obtained in high yield by treating rice straw with sodium sulfite.

304. MARIAKULANDAI, A. A note on paddy straw treatment for improvement of feeding quality. Madras Agr. J. 41(1):16-17. Jan.1954. 22 M262
Indicates that mere water washing of paddy straw improves its quality as feed.

305. *MARSDEN, M. W. Fiber, etc., from rice-straw. U. S. Pat. 1,313,403. Aug.19,1919.
Chem. Abs. 13:2767. 1919.
Byproducts of fiber making are alcohol and fertilizer.

306. *MARSONI, S. Cellulose, Brit. Pat. 533,423. Feb.13,1941; Austral. Pat. 113,133, May 19,1941.
Chem. Abs. 36:1177,3357. 1942.
Several kinds of straw, including rice straw, are washed. After maceration the resulting material is again. washed, mechanically disintegrated, screened, and finally concentrated or dehydrated.

307. *MATSUDA, K. Cottonlike fibers from rice straw. Jap. Pat. 172,301. Feb.8,1946.
Chem. Abs. 43:6833. 1949.

*Not examined.

308. *MIRCHANDANI, R. T. Role of cultural improvements in the increased production of paddy in Sind. Indian Farming 8:386-390. Aug.1947. 22 In283
Brit. Abs. B-III July 1949:275.
Rice straw and rice husks are burned to provide suitable ash beds which allow earlier transplanting with economy of labor and increased yield.

309. MURTI, P. B. R., and SESHADRI, T. R. Paper pulp from annual crops. I. Rice straw. Indian Acad. Sci. Proc. Sect. A. 12:519-531. Dec.1940. 513 In25
Chem. Abs. 35:3439. 1941.
With straw containing 37.5 percent Cross and Bevan cellulose, the pulp yield is about 44 percent; this pulp contains 77-84 percent of alpha-cellulose and 6.5-9.6 percent lignin, with 3-4 percent ash.

310. MURTI, P. B. R. Paper pulp from annual crops. II. A note on the yields and characteristics of pulps from different varieties of rice straw. Indian Acad. Sci. Proc. Sect. A. 13:564-565. June 1941. 513 In25
Chem. Abs. 35:7708-7709. 1941.
Small differences in composition exist in varieties grown under the same conditions of soil and cultivation but more marked changes seem to be brought about by variations in these conditions.

311. NAGATA, S. Untersuchung über die Herstellung des Strohrohzellstoffes. I. Mitteilung. Allgemeine Zusammensetzung von Reisstroh. (In Japanese.) Cellulose Indus. 13:192-196. June 1937. 309.8 C332
German abstract in Abstracts from the Transactions, p. 30-31.
Describes preparations of crude straw cellulose giving general composition of rice straw.

312. NIKOLAEV, A. Vysokoskorostnai͡a gazifikatsii͡a mestnykh tverdykh topliv s malym nasypnym vesom. Novosti Tekhniki 10(8):13-15. Apr.1941. Libr. Cong.
Chem. Abs. 37:5221. 1943.
Chem. Zentbl. 113(II):734. Aug.12,1942. 384 C42
Rapid gasification of low-density solid fuels locally available, such as rice straw. The producer gas, with a heating value of 1100-1350 kg.-calories/cu. m., can be used in ordinary internal-combustion engines.

313. *NOGUCHI, T. Xanthation in the viscose process. I. Influence of composition of alkali cellulose and xanthating conditions upon the degree of xanthation. (In Japanese.) Soc. Textile & Cellulose Indus. (Japan) Zasshi (J.) 6:153-155. 1950.
Chem. Abs. 46:5834. 1952.
Xanthation of alkali cellulose from rice paper and rayon pulp.

314. NOVELLI, N. Per una miglior utilizzazione della paglia da riso. Gior. di Risicolt 5:147-154. May 15, 1915. 59.8 G48
Chem. Abs. 10:1238. 1916.
Abstract in Expt. Sta. Rec. 34:72. 1916. 1 Ex6R
In studying a better utilization for rice straw, its average digestible nutrients were found to be: protein 1; fat 0.44; carbohydrates 28.63 percent. Ensiled rice straw desirable feed material.

315. OFFERMANNS, F. Muskauer fortlaufendes Verfahren zum Aufschluss von Holz und Einjahrespflanzen. Papierfabrik. Wchnbl. f. Papierfabrik. 2:57-60. May 1943. 302.8 P1933
Chem. Abs. 38:2488-2489. 1944.
The Muskau continuous process for pulping wood and annual plants. Data are given regarding strength tests on pulps, including that for rice straw, made by this process.

316. *OKAMOTA, S., and HAYAKAWA, S. Utilization of rice straw. (In Japanese?) Soc. Textile & Cellulose Indus. (Japan) Zasshi (J.) 6:391-394. 1950.
Chem. Abs. 46:4791. 1952.
Pentosan was extracted and residue made into a pulp.

317. OKUDA, A., and HORI, S. Chromatographic investigation of amino acids in humic acid and alkaline alcohol lignin. Kyoto U. Res. Inst. Food Sci. Mem. 7: 1-5. Mar.1954. 389.9 K99
Chem. Abs. 48:7897. 1954.
Lignin was prepared from rice-plant straw, wheat straw, pine needles and leaves.

*Not examined.

318. OREL, R. Pouvoir calorifique et composition chimique des matières cellulosiques. Chim. & Indus. 6:240-245. Mar.1949. 383 C42

Chem. Abs. 43:7225. 1949.

Rice straw was one of 21 materials tested for heating value and chemical composition.

319. OSUGI, S., and YOSHIE, S. Decomposition of organic fertilizers. II. Relations between the chemical composition and decomposition. (In Japanese.) Agr. Chem. Soc. Japan. J. 6:917-926. Oct.1930. 385 Ag8

Chem. Abs. 25:2231. 1931.

Decomposition of rice straw rapid during the first 17 days.

320. OSUGI, S., and YOSHIE, S. On the constituents of manures and the rate of their decomposition in soil. Kyoto Imper. U. Col. Agr. Mem. 12:41-57. Feb.1931. 107.6 K994

Chem. Abs. 25:3759-3760. 1931.

No organic nitrogen decomposition in rice straw was noticed on account of the marked assimilation of solution nitrogen by micro-organisms. Analysis given.

321. PACI, C. L'utilizzazione della paglia di riso. Cron. Econ. 147:19-24. Mar.1955. 280.8 C882

Use of rice straw as feed.

Also in Riso 4(6):20-22. June 1955. 59.8 R49

322. PATWARDHAN, V. N. Fermentation of rice straw by Bacillus acetoethylicus. Indian Chem. Soc. J. 7:531-536. June 1930. 385 In27

Chem. Abs. 25:311-312. 1931.

Alcohol-acetone yield too low to make process practical.

323. PERIS CHUST, L., and PRIMO YÚFERA, E. Obtención de pastas de celulosa a partir de residuos de prehidrólisis de paja de arroz. (Abs.) Chim. & Indus. 74(4A):170. Oct.1955. 383 C42

Abstract of paper given at 28th International Congress of Industrial Chemistry, Madrid, Oct. 1955.

Rice-straw pulps were analyzed, and results and yields are given.

324. *POMILIO, U. Extraction of cellulosic fibers from vegetable material. Brit. Pat. 489,302. July 25, 1938.

Chem. Abs. 33:378. 1939.

Semipulp suitable for papermaking and cardboard from rice straw, among other substances.

325. PORTUGAL, N. C., and GOMEZ, L. Notes on the utilization of rice straw (an extension of the work of D. R. Lopez and L. Gomez). Philippine U. Nat. Appl. Sci. B. 7:29-32. July 1939. 475 P532

Chem. Abs. 34:261. 1940. Cf. 32:8774. 1938.

Unbleached yield 37.9 percent; bleached yield 26 percent; cellulose content 92 percent; pentosans 15-16 percent; alpha-cellulose content 91.5 percent (based on cellulose) and copper No. 0.04-0.05. Papers were prepared which had good tearing resistance.

326. PRAKASH, R., and SAKSENA, R. K. Decomposition of paddy and bajra (Pennisetum typhoideum) straws by fungi commonly found in Allahabad soils. Indian Acad. Sci. Proc. 36B:119-128,illus. 1952. 513 In25B

Chem. Abs. 47:5056. 1953.

Results with 22 fungi studied under controlled laboratory conditions showed no uniformity in rates of decomposition by various fungi.

327. REYES, F. D., and CRUZ, A. O. Cogon and rice straw as raw material for paper manufacture. Philippine J. Sci. 38:367-376. Apr.1929. 475 P53

Chem. Abs. 23:4818. 1929.

Milder digestion used for rice straw than for cogon. Cellulose content for rice straw 42 percent.

328. *SAEGUSA, H. (to OSAKA TOGYO K. K.) Rayon pulp from Graminaceae, such as rice straw. Jap. Pat. 131,380. July 27,1939.

Chem. Abs. 35:1993. 1941.

Method described.

329. SANSOME, R. Die Verarbeitug von Reisstroh zu Zellstoff und Papier. Papierfabrik. Wchnbl. f. Papierfabrik. 4:143-146. July 4,1943. 302.8 P1933

Chem. Abs. 38:5081. 1944.

The manufacture of pulp and paper from rice straw. Paper is satisfactory for cigarette and similar papers.

330. SARAO, F. B. Value of Philippine composts. Philippine Agr. & Forester 6:128-134. Jan./Feb.1918. 25 P542

Chem. Abs. 13:1120-1121. 1919.

Abstract in Expt. Sta. Rec. 39:523. 1918. 1 Ex6R

Rice straw composts very rapidly.

331. SATO, S. Studies on the methods to lower the high temperatures of paddy field in the warm district in Japan. Mulching with rice straw and grass (preliminary report). (In Japanese.) Soc. Agr. Met. Japan. J. Agr. Met. 11(1):39-40. July 1955. 340.9 So1

English summary.

332. SELSBEE, E. New paper for old China. Paper Mill News 68(44):76,78,80. Nov.3,1945. 302.8 P195

Describes making of "Suan" fine writing paper from rice straw by hand labor among small cooperatives.

333. SEN, K. C., RAY, S. C., and TALAPATRA, S. K. Nutritive value of alkali-treated cereal straws. Indian J. Vet. Sci. 12:263-296. Ref. Dec.1942. 41.8 In22

Chem. Abs. 42:290. 1948.

Nutritive value of paddy straw was increased by alkali treatment in digestibility and metabolism experiments with heifers.

334. SENGUPTA, P. N., and SEN, H. K. Studies on ligno-cellulose. Sci. & Cult. 3:442. Feb.1938. 475 Sci24

Chem. Abs. 32:3605-3606. 1938.

Rice straw: 24.2 percent lignin; 9.9 percent acetic acid; 44.6 percent cellulose (on dry basis.)

335. *SETTON, D. Fibers from rice straw. Russ. Pat. 44,634. Oct.31,1935.

Chem. Abs. 32:3170. 1938.

Straw boiled in water for 10-15 minutes, treated 30 minutes at 40-50° with a solution containing 7-9 gm. sodium hydroxide per liter, treated with soap, machine oil, and caustic, and combed.

336. SHIHA, K. The minor elements contained in the soil and in some green leaves. I. Copper content. (In Japanese.) J. Sci. Soil & Manure 22:26-28. Aug.1951. 56.8 J27

Chem. Abs. 46:1683. 1952.

The amount of copper in dried matter and in ash was less in straws of rice and wheat.

337. *SHIMODA, I. Rayon pulp from grassy plants. Jap. Pat. 4901('52). Nov.24,1952.

Chem. Abs. 48:371. 1954.

Yield from rice straw was 25 percent.

338. SHINRA, K., and YOUN, P. T. The nitric acid pulping process. IV. Comparison of amount of nitric acid consumed in cooking various materials. (In Japanese.) Soc. Chem. Indus. Japan. J. 46(4):293-297. Apr. 1943. 385 J82

Chem. Abs. 43:1973. 1949.

The minimum requirement of nitric acid was the smallest in the case of rice straw.

339. SIMODA, I. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. II-III. Mitteilung. Aufschliessung des Reisstrohs mit verdünnter Salpetersäure I-II. (In Japanese.) Cellulose Indus. 12:39-47, 71-75. Feb.-Mar.1936. 309.8 C332

German abstracts in Abstracts from the Transactions, p. 7-13,15-19.

Chem. Abs. 30:5411,7843. 1936.

Study on the preparation of cellulose pulp by the nitric acid process deals with the decomposition of rice straw with dilute nitric acid. Concentrated nitric acid of 2 percent or more should be used in the cooking. The yield of cellulose is 32 percent of the straw.

*Not examined.

*Not examined.

340. SIMODA, I., and YOSINO, K. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. VII. Mitteilung. Über die Wirkungen von Salpetersäure, Schwefelsäure und Mischsäure auf Reisstroh. (In Japanese.) Cellulose Indus. 14:450-452. Dec.1938. 309.8 C332

German abstract in Abstracts from the Transactions, p. 81-84.

Chem. Abs. 33:8403. 1939.

The action of nitric acid, sulfuric acid, and mixed acids on rice straw. By using mixture of concentrated nitric and sulfuric acids, a considerable economy of nitric acid was achieved.

341. SIMODA, I., and MURAKOSHI, T. Herstellung des Salpetersäureaufschlussverfahren. VIII. Mitteilung. Aufschliessung von Reisstroh mit Salpetersäure und Mischsäure. (In Japanese.) Cellulose Indus. 15:7-9. Jan.1939. 309.8 C332

German abstract in Abstracts from the Transactions, p. 2-5.

Chem. Abs. 34:1846. 1940.

The decomposition of rice straw with nitric acid and mixed acids. Attempts were made to produce nitric acid pulp for rayon. The ash content was greater than that of commercial sulfite pulps. With 5 percent nitric acid alone the pulp yield was about 31 percent, while with the mixed acids it was reduced to about 28 percent.

342. SIMODA, I. Herstellung von Zellstoff im Salpetersäureaufschlussverfahren. IX. Mitteilung. Auffrischung und Wiederverwendung der Säureablauge beim Aufschluss von Reisstroh mit Salpetersäure. (In Japanese.) Cellulose Indus. 15:378-379. Sept.1939. 309.8 C332

German abstract in Abstracts from the Transactions, p. 75-76.

Chem. Abs. 34:4566. 1940.

Recovery and reuse of nitric acid liquor in the digestion of rice straw. Liquor reused three times produced no deterioration in the alpha-cellulose. Content of pentosans and ash tended to increase.

343. SIMODA, I. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. XI. Mitteilung. Aufschliessung von Reisstroh durch Dreistuffenaufschlussverfahren. (In Japanese.) Cellulose Indus. 15:470-474. Nov.1939. 309.8 C332

German abstract in Abstracts from the Transactions, p. 83-87,

Chem. Abs. 34:6066. 1940.

Three-stage hydrolysis of rice straw. The yield and ash content are less than, the pentosan content is greater than, and the consumption of nitric acid is much less than when the first stage is omitted.

344. SIMODA, I. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. XII. Mitteilung. Salpetersäure-Reisstrohzellstoff als Rohstoff von Kunstfaser unter besonderer Berücksichtigung der Heterogenität der Viskosität. (In Japanese.) Cellulose Indus. 16:6-8. Jan.1940. 309.8 C332

German abstract in Abstracts from the Transactions, p. 1-4.

Chem. Abs. 35:2717. 1941.

The heterogeneity of nitric acid rice-straw pulp with respect to viscosity. Rice-straw pulp and a commercial sulfite woodpulp are fairly similar in molecular chain-length distribution.

345. SIMODA, I. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. XIII. Mitteilung. Über die Asche von Reisstroh und die Einflüsse von Salpetersäurebehandlung auf die Asche. (In Japanese.) Cellulose Indus. 16:127-128. Apr.1940. 309.8 C332

German abstract in Abstracts from the Transactions, p. 15-17.

Chem. Abs. 35:3814. 1941.

The ash of rice straw and the effect of nitric acid on it. The ash of rice straw is almost completely removed in the 3-stage nitric acid process.

346. SIMODA, I., and KONO, M. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. XIV. Mitteilung. Herstellung von Reisstrohzellstoff unter Berücksichtung der Herstellungskosten. (In Japanese.) Cellulose Indus. 16:328-335. Oct.1940. 309.8 C332

German abstract in Abstracts from the Transactions, p. 37-38.

Chem. Abs. 35:5695. 1941.

The manufacture of pulp from rice straw with considerations of the production cost. By using undiluted nitric acid or nitrogen-dioxide gas and restrengthening the soda solution with lime the cost may be brought down to 10-11 sen per pound.

347. SIMODA, I., and KONO, M. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. XV. Mitteilung. Über die Geeignetheit des Salpetersäureaufschulssverfahrens zum Aufschliessen von Gramineae. (In Japanese.) Cellulose Indus. 17(2):76-77. Feb.1941. 309.8 C332

German abstract in Abstracts from the Transactions, p. 13-15.

Chem. Abs. 35:5695. 1941.

Suitability of the nitric-acid process for the Gramineae. Rice straw was one of five materials used. Method is described and yield given.

348. SIMODA, I., and KONO, M. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. XVI. Mitteilung. Über die Möglichkeit zur Gewinnung von Furfurol und Zellstoff aus Reisstroh. (In Japanese.) Cellulose Indus. 17:78-80. Feb.1941. 309.8 C332

German abstract in Abstracts from the Transactions, p. 15-17.

Chem. Abs. 35:5695. 1941.

Possibility of obtaining furfural and cellulose from rice straw. It is possible to obtain them simultaneously.

349. SIMODA, I., and KONO, M. Herstellung des Zellstoffes im Salpetersäureaufschlussverfahren. XVII. Mitteilung. Herstellung der Viskose aus Salpetersäurezellstoff aus Reisstroh. (In Japanese.) Cellulose Indus. 17:233-237. June 1941. 309.8 C332

German abstract in Abstracts from the Transactions, p. 42-44.

Chem. Abs. 36:2136,4334. 1942.

The manufacture of viscose from nitric acid pulp prepared from rice straw. Thread made from rice-straw viscose was as satisfactory as that made from coniferous-wood viscose. Rice-straw thread not as white as coniferous-wood thread.

350. *SIMOMURA, Y. Pulp from rice straw. Jap. Pat. 134,114. Jan.9,1940.

Chem. Abs. 35:4953. 1941.

A procedure for obtaining and bleaching pulp from rice straw.

351. SIRCAR, S. S. G., DE, S. C., and BHOWMICK, H. D. Micro-biological decomposition of plant materials. I-II. Indian J. Agr. Sci. 10:119-157. Apr.1940. Ref. 22 Ag83I

I. Changes in the constituents of rice straw (kanaktara) produced by micro-organisms present in soil suspension under aerobic, anaerobic and waterlogged conditions. II. A note on the changes in the methoxyl and nitrogen content of lignin of rice straw during its decomposition by micro-organisms.

Chem. Abs. 34:7052-7053. 1940.

352. SNELL, J. R. Anaerobic digestion. III. Anaerobic digestion of undiluted human excreta. Sewage Works J. 15:579-701. July 1943. 293.8 Se8 Se8

Chem. Abs. 37:6782-6783. Cf. 3539. 1943.

Rice straw is furnished to give carbon dioxide by fermentation to neutralize urine nitrogens. About 100 pounds of rice straw per day would be required for a small sewage plant.

353. SNELL, M. G., and others. Fattening steers on corn, rice products and rice straw. La. Agr. Expt. Sta. B. 389,25 p. Ref. 1945. 100 L93

C. I. Bray, F. L. Morrison, and M. E. Jackson, joint authors.

Rice straw at $7.60 per ton was a more profitable roughage than hay at $19.50 per ton.

*Not examined.

354. SNELL, M. G., and MORRISON, F. L. Rice and rice products as feeds for fattening cattle. Rice J. 43(3):13-14. Mar.1940. 59.8 R36.

Rice straw was one of the products fed to steers.

355. SNELL, M. G., and others. Wintering beef cows in the rice area. La. Agr. Expt. Sta. B. 387,31 p.,illus. Ref. 1944. 100 L93

C. I. Bray, F. L. Morrison, M. Jackson, and A. S. Gates, joint authors, in cooperation with Swift and Company.

Supplementing rice straw and pasture with mixed rice products and cottonseed meal reduced death losses, increased the calf crop and produced more beef.

356. *SPAHR, W. Origin and development of the paper industry in Brazil. Ztschr. f. Papier, Pappe, Zellulose u. Holstoff 56:190-194. 1938.

Chem. Abs. 32:9492. 1938.

Rice straw discussed in relation to pulping qualities.

357. STANGALINI, L. La paglia di riso e la sua utilizzazione nell'industria della carta. Indus. della Carta 1:503-510. Nov.1934. 302.8 In2

Chem. Abs. 30:3639. 1936.

Rice straw and its utilization in the paper industry. The best process is treatment with calcium bisulfite followed by dilute sodium hydroxide.

358. *SUGIMOTO, S., and YOSIKAWA, S. Preparation of pulp from rice straw. II. (In Japanese?) Osaka, Japan. Imper. Indus. Res. Inst. Rpts. 19(5):1-19. 1938.

Chem. Abs. 33:2333. 1939. Cf. 32:8134. 1938.

Study extended to other raw materials. Rice straw is best raw material for preparation of pulp.

359. *SUGIYANA, S., and SENGOKU, M. Preparation of pulp from rice straw. (In Japanese?) Osaka, Japan. Imper. Indus. Res. Inst. Rpts. 18(12):1-17. 1938.

Chem. Abs. 32:8134. 1938.

Pulp contained 90 percent alpha-cellulose, 5 percent beta-cellulose, 0.3 percent ash and had a copper value of 1.04. Nitric acid (3-4 percent) and sodium hydroxide (6-7 percent) cooks give above pulp. Hydrochloric acid cook was also satisfactory.

360. SUZUKI, K., and CHIBA, H. Digestion test of feeds of the horse. (In Japanese.) Nippon Chikusan Gakkai Ho. Jap. J. Zootech. Sci. 17:83-86. Dec.1946. 49 N62

Chem. Abs. 44:6929. 1950.

Rice straw was one of the feeds tested.

361. *SWAN, P. Rice straw pulp. U. S. Pat. 1,859, 224. May 17,1932.

Chem. Abs. 26:3921. 1932.

Description of apparatus and procedure for cooking with causticized liquor.

362. TAKEHARA, S. Studies on pentosans in raw cellulose materials. X. Reaction of alkali on pentosan in pulp. XI. Effect of pentosan on xanthation of cellulose. (In Japanese.) Soc. Chem. Indus. Japan. J. 47:553-557. 1947. 385 J82

Chem. Abs. 43:1977. 1949.

White-birch pulp of Part X and a sample of rice-straw pulp were used to study the effect under various conditions.

363. TAKETOMI, N. Production of alcohol from rice straw. (In Japanese.) Soc. Chem. Indus. Japan J. 29:43-47. Jan.1926. 385 J82

English abstract, p. 93.

Chem. Abs. 20:1492. 1926.

Composition of rice straw is given. It was heated with sulfuric acid, neutralized and fermented with distillery yeast. The yield of alcohol was about 5.4 percent of the dry matter used.

364. TALAPATRA, S. K., RAY, S. C., and SEN, K. C. Calcium assimilation in ruminants on oxalate-rich diet. J. Agr. Sci. 38:163-173. Apr.1948. 10 J822

Chem. Abs. 44:9524. 1950.

On feeding paddy straw.

Malnutrition and stunted growth were due in some degree to chronic alkalosis which can be prevented by suitable processing of the straw.

365. TANAKA, M. Gewinnung der festen Fiber aus Reisstroh. Chem. Soc. Japan. B. 11:35. Jan.1936. 385 T57B

Chem. Abs. 30:8603. 1936.

Isolation of solid fiber from rice straw. Details are given for the isolation of tubular cellulose from the straw.

*Not examined.

366. TANAKA, M. Isolation of alpha cellulose from rice straw. (In Japanese.) Chem. Soc. Japan. J. 56:603-605. May 1935. 385 T57J

Chem. Abs. 29:7639. 1935.

Purity was 93-99 percent.

367. TANAKA, M. A method for isolating a cotton fiber-like material from rice straw. (In Japanese.) Chem. Soc. Japan. J. 56:1525-1526. Dec.1935. 385 T57J

Chem. Abs. 30:1557. 1936.

A method of purification of cellulose by treating the straw in alkali, vegetable glue, and resinous substance.

368. THOMAS, G. M., RAMAKRISHNAN, T. S., and NARASIMHALU, L. Paddy straw mushroom. Madras Agr. J. 31:57-59. Feb.1943. 22 M262

A mushroom known as "paddy straw mushroom" (Volvaria diplasia) is cultivated in Burma and Malaya on beds of paddy straw. Gives methods and yields.

369. TOLES, J. K. Fiber from rice-straw. U. S. Pat. 1,235,258. July 31,1917.

Chem. Abs. 11:2617. 1917.

The fiber prepared by this method may be used for making strawboard, roofing, heat insulation such as refrigerator linings, or other sheet materials.

370. *TOLES, J. K. Fiber from rice-straw. U. S. Pat. 1,262,872. Apr.16,1918.

Chem. Abs. 12:1590. 1918.

The fiber obtained by this method is suitable for thermal insulation.

371. *UNIVERSAL CELLULOSE (PTY.) LTD. Paper pulp. Austral. Pat. 105,592. Nov.3,1938.

Chem. Abs. 33:2715. 1939.

Cellulosic material, particularly bagasse and rice straw, impregnated with a liquor containing a bacterial culture, fermentation allowed to proceed; soaked in monosulfite solution and dried.

372. UTSUMI, I., and NAKAGAWA, K. Fundamental studies on the using and processing of rice straw. II. On the strength and elongation of straw ropes. (In Japanese.) Mié U. Facul. Agr. B. 11:153-162. Oct.1955. 107.6 T78

English summary.

Factors studied were: Effect of fertilizing of plants on quality of straw, effects of storage, of climate, of methods of pounding and preparing the straw, of twisting and knotting the rope, and the relation of diameter to strength.

373. UTSUMI, I., and NAKAGAWA, K. Fundamental studies on the using and processing of rice straw. III. On the effect of antiseptic treatment of rice straw rope on its preservative capacity. (In Japanese.) Mié U. Facul. Agr. B. 13:181-186. Oct.1956. 107.6 T78

English summary.

The durability of rice-straw rope was increased by soaking in sulphate copper solution, pine-root oil, and creosote oil, but strength of the rope diminished after a year. Mixtures of kerosene and creosote oils and of kerosene and pine-root oils were less effective. Bordeau solution had no effect.

374. UTSUMI, I. On some experiments of reletive [sic] wear of straw-sandals. (In Japanese.) Mié U. Facul. Agr. B. 5:74-80. Dec.1952. 107.6 T78

Probably rice straw.

375. VANOSSI, L. Utilizzazione dei sottoprodotti. Riso 5(2):8-10. Feb.1956. 59.8 R49

Utilization of byproducts.

376. VIDAL, and ARIBERT. Essais de fabrication de papier effectués avec diverses plantes d'Indo-Chine. Cong. de la Prod. Colon., Marseille, 1922. Compt. Rend. et Raps., Textiles [etc.], p. 100-116. Ref. 26 C762

Chem. Abs. 17:2503. 1923.

Papermaking tests with various plants from Indo-China show rice-straw pulp especially suited for use as a filler, like esparto.

377. VIGUERA LOBO, J. M., LAFUENTE FERRIOLS, B., and PRIMO YÚFERA, E. Aprovechamiento industrial de los subproductos del arroz. I. La prehidrólisis de la paja. Rev. Cien. Apl. 7:22-33. Jan./Feb.1953. 475 R324

Chem. Abs. 47:7214. 1953.

Industrial utilization of the byproducts of rice. I. The prehydrolysis of the straw.

Data are presented in 17 tables and 10 graphs.

*Not examined.

378. VIGUERA LOBO, J. M., LAFUENTE FERRIOLS, B., and PRIMO YÚFERA, E. Aprovechamiento industrial de los subproductos del arroz. IV. Xilosa de la paja. Soc. Españ. de Fís. y Quím. An. Ser. B, Quím. 48B(12):901-910. Dec.1952. 385 So16
Chem. Abs. 47:8365. 1953.
Brit. Abs. B-III:278. June 1953.
English summary.
Industrial utilization of byproducts of rice. IV. Xylose from the straw. A study of the best way to obtain xylose from rice-straw prehydrolysis liquors. Xylose yield, reducers, ash, and moisture are given.

379. VIGUERA LOBO, J. M., LAFUENTE FERRIOLS, B., and PRIMO YÚFERA, E. Aprovechamiento industrial de los subproductos del arroz. VII. Levaduras alimenticias a partir de los prehidrolizados de la paja. Soc. Españ. de Fís. y Quím. An. Ser. B. Quím. 48B(12):911-918. Dec.1952. 385 So16
Chem. Abs. 47:8276. 1953.
Brit. Abs. B-III:315. July 1953.
English summary.
Industrial utilization of byproducts of rice. Food yeast separated from the prehydrolyzates of the straw. With Toxtula utilis a yield of 44 percent of dry yeast resulted, Candida arborea gave 50 percent yield.

380. WALSH, G. E. Waste products for paper pulp. Paper Making 36:283-285. Sept.1917. 302.8 P191
Chem. Abs. 12:764. 1918.
Abstract in Soc. Chem. Indus. J. 36:1091. Oct.31, 1917. 382 M31
An excellent paper can be obtained from rice straw. There were at that time only four paper mills in the United States making use of it.

381. WARTH, F. J. Digestion experiments with paddy straw. Agr. J. India 18(5):456-464,illus. Sept. 1923. 22 Ag83
Chem. Abs. 18:851. 1924.
Bullocks fed 10 months on rice straw needed some supplemental concentrate to maintain nitrogen balance.

382. WARTH, F. J., and GOSSIP, F. J. Feeding experiments at Karnal, 1925-26 and 1926-27. India. Dept. Agr. Mem. Chem. Ser. 10(1):1-24,illus. Aug.1928. 385 In2
Chem. Abs. 23:1183. 1929.
Rice straw produced better growth in calves than wheat straw. Its nutritive value was about equal to good sorghum hay. Digestibility test results are tabulated.

383. WEST, C. J. Papermaking materials. I. Cereal straws. Inst. Paper Chem. Bibliog. 171,229 p. Appleton, Wis.,1949. 241.4 Ap5
Bibliography of 932 references with digests and annotations.
Includes references to rice straw.

384. WEST, C. J. Paper making trials at the Imperial Institute. Paper 28(12):25-27,39. May 25,1921. 302.8 P198
Chem. Abs. 15:2983. 1921.
A review of certain bulletins of the Imperial Institute. Rice straw and hulls discussed on p. 26, based on Bulletin 16. (SEE item 269)

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*Not examined.