

*SORGHUM SUGAR.*

EXPERIMENTS are being carried on at Fort Scott, Kan., this fall, under the direction of the U. S. department of agriculture, in the application of the diffusion process for the extraction of the sugar from sorghum cane. This is a continuation of the work at Ottawa, Kan., last year, the results of which are embodied in Bulletin No. 7, chemical division, department of agriculture. At Ottawa experiments were made in connection with a sugar-factory, which employed a mill to work up most of their crop. This year the Parkinson sugar company of Fort Scott, relying upon the results obtained there, erected no crushing machinery whatever, depending entirely upon the diffusion battery to extract the sugar from their cane-crop of over eight hundred acres.

The crop this year showed the remarkable power of resistance to drought of the sorghum-plant, the patches of which constituted about the only oases of green in an otherwise dry and withered-up vegetation.

The factory has been in operation since about the 1st of September; and while the results do not, perhaps, fulfil the anticipations of the more ardent advocates of diffusion, still they are in many respects most satisfactory, and full of promise for the future success of the sugar industry.

It is turning out a very fine article of sugar, in large quantities, fully as good as to crystallization, color, and taste, as any made by mill extraction; while the analysis of the exhausted chips shows an almost complete extraction of all the sugar content of the cane, — something which is impossible to obtain by pressure extraction, however thoroughly applied.

The principal difficulties which were encountered have been, first, the proper chipping of the cane, or preparing it for diffusion; and, second, the treatment of the juice obtained. These are both points in which the previous applications of diffusion, viz., on beets, offered but little guidance, the nature of the substance used being so very dissimilar. The sorghum cane is fed directly to the cutters, with the leaves and sheaths still on (it is too expensive to strip it); and while these are partially taken out afterwards by means of blowers and fans, still a large percentage find their way into the cells with the chips of cane, and from these a great many colloid matters are extracted by the juice which interfere materially with its proper clarification and the crystallization of the sugar. The solution of this difficulty will undoubtedly be found in a more perfect mechanical cleaning of the chips, or by the invention of machinery by which the stripping of

the cane can be accomplished more cheaply than by hand-labor.

The problem of the proper treatment of the juice calls for the greatest amount of chemical ingenuity and invention. The juice obtained by diffusion is much more impure and difficult to treat than that obtained by a mill, partly on account of the presence of the leaves, etc., as already mentioned, and partly because the tissue of the cane does not seem to be as good a medium for osmosis as that of the beet.

The process sought to be applied to this juice at Fort Scott is that of carbonatation as used upon beet-juice. The details of this process are well known to those versed in sugar methods: milk of lime is added in large excess to the juice, and is then precipitated as carbonate by treating with carbonic-acid gas. The glucose, however, which is a constant constituent of sorghum juice, and of which the beet contains no trace, unites with the lime to form a dark-colored, bitter-tasting compound, which no amount of carbonating can break up. This difficulty has been to a large extent surmounted by performing the carbonatation at a low temperature, and heating only after the excess of lime has been entirely neutralized by the carbonic-acid gas. A novel modification of this process has also been attempted by adding freshly precipitated carbonate of lime directly to the juice, heating, and sending directly to the filter-presses, thus avoiding the direct contact of the juice with caustic lime. The indications from the present results are most hopeful, — that, with the expenditure of a small fraction of the money and brains that have been required to develop the sugar of the beet, the sorghum-sugar industry will take a leading place among American industries, and enable Uncle Sam to accomplish a long-cherished hope, viz., of making his own sweets.

It is the intention of the department of agriculture, at the conclusion of the sorghum season, to make some trials of the Kansas machinery upon Louisiana cane, getting it in by rail, pending the trial of next year, when it is expected to erect a diffusion plant in that state. With the proper co-operation of the railroads and of the southern planters, this can undoubtedly be carried out; and the results will be most valuable. The sugar-planters of Louisiana have been watching with the keenest interest the experiments in Kansas, several of their representative men being on the ground. They reason that its success upon sorghum cane will augur its success upon their own plant, many of the difficulties attendant upon its application to the former not holding good with respect to the latter.