

FOR THE BREWER.

The Practical Valuation of Barley, Malt and Hops.

(Continued from last week.)

II.—MALT.

In valuing a sample of malt we must carefully notice whether the malt has been well screened, and whether it is free from mould, as these factors have an important bearing upon extract and flavor. The "malt culms" should be thoroughly removed, as these tend to give the beer a somewhat rank flavor, and might tend to influence the keeping power of the beer owing to their high percentage of readily soluble nitrogen compounds. This question of removal of rootlets is fairly well attended to by some of our large brewers and malsters, but how often do we find some of the smaller brewers who make their own malt in a primitive sort of way, throwing it off the kiln onto a heap, without previous removal of the rootlets, relying upon removal of the malt by just rousing out to crushing? Now this system should be condemned most strongly, as by the time of crushing the rootlets will have absorbed much moisture and become so friable that their removal is a matter of impossibility, whereas they should have been separated quite readily immediately after removal from the kiln. There is a further objection to storing malt without previous screening. The rootlets are very hygroscopic, and there is no doubt that they conduct the moisture, which they absorb from the air, to the interior of the malt corns; consequently the malt becomes slack, and undergoes those objectionable changes which are so little understood by chemists, and yet so well known to brewers who have to deal with this class of material. If we are purchasing such malt it will, more over, increase our trouble in producing a good stout to pay for this water. Further evidence of a good malt is its perfect friability, and even development of the acetone. There should, if possible, be a complete absence of starchy corns, and the floury corns should average a weight of about five per cent. In order to satisfy ourselves as to the development of the acetone, we must sort out several hundred corns; we can then readily arrange them in series according to length of acetone, and determine the percentage of corns in which the acetone is grown up to less than half, three-fourths, and the whole length of corn. The average length should be about three-fourths, and in a perfect malt the acetone should attain the same length in every corn, as this will be an evidence of barley with even germinating power, and good working of floors.

This "deters oil sinkers" test is capable of giving us some assistance. This test is open to several objections, and when carelessly employed may lead us to form a very erroneous opinion upon a sample of malt, but with proper precautions it is a very useful test. We must first of all assure ourselves that the malt sample is not slack, else the percentage of sinkers may come out abnormally big. We should then count the percentage of sinking grains, and subsequently carefully examine those, observing how many of these have missed, and how many have partially grown. If the percentage of sinking corns is under 5 per cent. we can pass the sample as fairly well malted, and I maintain that if the sinkers are equal, the sample containing the lowest percentage of sinking corns will be of the greatest value to the brewer. The malt should have that rich, aromatic flavor which corresponds to careful withering, careful preliminary kilning, and final thorough cooking at the necessary tem-

peratures. I would further suggest that brewers making their own malt should instruct the working maltster to furnish them with a small well-corked bottle full of malt of every kiln unloaded. These average samples should be carefully examined by the sinker and tester, and by this means a check is upon the working malsters, and a brewer could select his best kilns for stock beer purposes, placing them into separate bins, and using up the doubtful kilns for stout. We should insist upon having friable malt; a steady malt is the most expensive in every way, because there are difficulties in the way of extract yield and such extract will be of doubtful composition. Yet it does not always follow that every friable malt is a good product. With such malts it is quite possible that the diastatic power may be too high, especially if the kilning has been faulty.

We can readily supplement these observations by making a careful miniature mash, which will give us some valuable information. This test is so very simple of performance, and requires so little material, that it can be considered complete without it. In conducting such a miniature mash, it is self-evident that in order to obtain comparative results among the various samples, the mash should be conducted in a precisely similar manner every time. Fifty grams of malt are taken and mashed into 200 c.c.'s of water to give an initial heat of 150 deg. F. The mash is kept at this heat for two hours. It is then cooled down and sufficient water is added to bring the total weight to 500 grams, and filtered through a small filter bag. We shall thus obtain a 10 per cent. solution.

The smell of the mash will be more or less aromatic, and the height of the final kiln heats. The mash should beak well, and the supernatant wort should be brilliant; it is only reasonable to expect that self-finishing and brilliant also can only be produced in well-ventilated worts. We should further observe whether the wort separates readily from the grains. Generally speaking, the cleaner and richer in extract the wort is, the more readily will it separate from the grains. We can also obtain a comparative idea of the relative diastatic powers of various samples, by following the conversion with the iodine test. We may take it that the sooner the starch reaction disappears, the more diastatic is the malt; if other conditions are equal. A first-class malt will show no starch reaction after fifteen minutes, while an inferior malt may take up to forty or fifty minutes. Malts requiring more than this time for conversion can only be used with safety by blending with a more diastatic variety. Finally, we can also determine the extract from the miniature mash, which, of course, is an item of the utmost importance in purchasing large quantities, yet it is necessary to refer to go into details of this simple calculation. There is, however, another determination, which is almost as important financially as the question of extract. I mean the determination of the moisture percentage. This question is of considerable importance, and often does not receive sufficient attention in malt dealings. Many firms are throwing money away in matters of this sort, while they are endeavoring to economize in other directions, where a saving is neither of advantage nor importance. It is perfectly evident that a malt containing four per cent. of water must have less value than one containing two per cent.

A malt contains two per cent. of water consequently a quarter will contain:

$$.98 \times 326 = 320.28 \text{ lbs. of water substance.}$$

This same quantity of dry substance would have to be used if the malt contained 1 per cent. of water, in order to produce an equal quantity of beer. Hence

$$320.28 \times 100 = 32,027$$

96

lbs. of this malt will have to be employed in order to produce the given extract, or about 6.7 lbs. more in every quarter. With a consumption of 5,000 quarters this represents

$$5,000 \times 6.7 = 33,500$$

326

quarters, and taking the value of malt at 40s. per quarter we get 9096 2-3 £199 about, as the money lost in the purchase of this quantity of malt.

These observations and simple estimations are of great assistance, in valuing a malt, but they can only give us incomplete, and possibly in some cases contradictory information as to the chemical composition of the sample. Absolute certainty can only be obtained by careful analysis, which will give us some information as to the relative proportion of the conversion products, and of that important item, the ready formed sugars.

III.—HOPS.

In valuing hops for brewing purposes, we have to depend almost exclusively upon external characteristics, among which aroma must rank first. It is the most valuable classes of hops, delicacy of aroma is combined with great pungency, while it would be futile to attempt to describe the various aromas obtainable from different classes of hops, and a thorough knowledge of this subject can only be obtained through careful observation extending over many years. I am inclined to think that the bulk of brewers pay far too little attention to the question of aroma, and detection of the different varieties of hops; in fact, they are almost entirely in the hands of their hop merchants in this matter. It would be well to know how many brewers (even of large experience) know the difference between a Golding and a Colgate hop; and yet their respective values on the market, and for brewing purposes are so different. Of course, in judging the aroma it is necessary to be possessed of a very keen sense of smell, in which some people are naturally deficient, while in such cases we must form our conclusions from other observations.

The color of the hop flowers is the first feature that presents itself; these should be of a pale yellowish green and bright appearance, and should be free from reddish brown spots. In judging by color is, however, only of use when we are dealing with hops which have not been sulphured on the kiln, since the process of sulphuring gives greater uniformity of color to the product, and a paler and fresher looking, and this circumstance is sometimes used in an unscrupulous way, in order to improve the appearance of discolored and spoiled hops, and to put them upon the market mixed with some better hops. Hops which have been so treated can usually be distinguished from others which have been only slightly sulphured, by carefully examining the lupuline constituents.

As lupuline also contains the most important constituents of the hop—the aromatic hop-oil and the bitter tasting hop resins. In the fresh condition these substances form a pale yellow liquid of an oil-like consistency, which color they impart to the lupuline globules. During storage of hops, according as the conditions are more or less favorable, decomposition takes place in the constituents of this lupuline, and a substance possessing a cheese-like odor takes the place of the aromatic hop-oil. At the same time the resins become converted into a dry, floury mass, and with further age this substance becomes darker and more brown in appearance. Of course the quantity of this lupuline is of the greatest importance, and the microscope can help us very materially

in this direction, especially if we bear in mind that the value of the lupuline constituent does not depend solely on the number of globules, but chiefly upon the manner in which these latter are filled. Perhaps the best test, well known to the practical brewer, is to rub the hop flower down in the warm hand to test the oily condition. The older the hops become, the less of this oiliness will be experienced.

The best hops are of medium size, and have a silky feeling when rubbed down. The commoner hop flowers often attain an elongated appearance with coarse ribs, and rough leaf covering. If we open up such hop flowers, we find at the root of the leaflets number of hop seeds, which very strongly diminish the value of the hops, owing to the rank-flavored extractive matters which they yield. In the best regulated hop gardens in Germany we find that great care is exercised in excluding the male hop plant, so as to avoid fructification of the female hop flowers; consequently in the best classes of German hops we do not find any hop seeds at all, or else in very small quantities. The brewer naturally hops growers find that the presence of the male plant greatly increases the quantity of the crop, and also the duration of the hop gardens, but I am inclined to think that the hop growers could learn something by studying the method of hop cultivation carried on in the Saaz district of Bohemia, where, I believe, the finest hops in the world are produced. These hops are never, or only rarely, made up in this country.

In connection with the subject of hop valuation, I would recommend to your notice the excellent paper on "Hops," recently read before the Institute of Brewing, by Messrs. Briant and Meacham. The paper is so full of interest, as evidenced by the feel of the sample when pressed downward by the hand, is of importance. This is seldom attended to by brewers, yet it has a marked influence on the keeping power of hops, and is worthy of the attention of the brewer. The elasticity of sample, it only applies to new hops, and that the hop samples should be open in a warm room for an hour or so before sampling. With new hops it is of the greatest importance that the brewer should see that they are well cured, and not fired or underdried; these points Messrs. Briant and Meacham have explained minutely. I am also glad to heartily endorse all these gentlemen say as to the importance of acetone. There can be no doubt that such trouble in brewing and cloudiness of beers can be traced to employing hops in which the resins are not sufficiently ripened. Often the high priced hops (which are brewed as guided by pale green color) give a serious trouble in this direction, owing to want of ripeness of the resins. Personally I would prefer to err on the side of color, as a ripe yellow hop does not yield too much color to worts, even for the lightest shade pale ales. Many good hops are thrown on one side because they have a brownish appearance, which may have been caused by being beaten about on the tables by storms, yet if we examine these hops we may find them full of rich condition, so that external color alone is not a sufficient guide.

There is no doubt that the quality of this year's hops will be far above the average, as the ripening process has taken place under the most favorable conditions, and there has been an absence of those storms which have in previous years so seriously damaged some otherwise excellent crops.

There has also been an almost entire absence of mould, which has enabled the grower to abstain from using sulphur on the plants. This sulphur is applied in the form of a fine powder, and in this form it is far more harmful to the brewer in his brewing operations than

A paper read before the members of the North of England Institute of Brewing, and reported in the current issue of the *Transactions* of that Institute.

WE G

Gu

H

and

a little sul

In the for

the hops,

brewing in

it would y

affect the y

roughs the

superfluous

It is a co

test which

the good in

has been f

and, on ex

day's time

owing to t

of silver.

The hops

have been

free from

direction

to exercise

great

It is import

district in