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Ascertaining Different Physical and Chemical Attributes In Relation To Quality Making Traits of Indian Wheat: A Review

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Abstract

Cereals are main foods for human nutrition substance and their use into a wide range of products is of abundant economic importance. Wheat is one of the major cereals across the world and is used mainly for the preparation of bread. Wheat in India is consumed mainly in the form of unleavened flat bread acknowledged as chapati. In Indian population mainly constitute onchapaties as important source of dietary proteins, calories, some of the vitamins and minerals for large section. Wheat has a special place in food security and economy of a big country like India. Wheat researchers had been successful to maintain steady growth in enhancing production and productivity. The contentment of fulfilling food demand of a large and growing population has urged the researchers to target similar accomplishments in end-product quality of this staple crop.

Introduction

Wheat (*Triticum aestivum*L.) has been a foremost staple diet of overarching population throughout the recorded history. Unlike other parts of the world where wheat is consumed as bread for basic food, chapati prepared from whole wheat flour is the predominant staple diet in Indian sub-continent. It was designated as the 'king of cereals' since of the acreage occupied and production compared to every other grain crop [1]. It is a self-pollinated crop. It is a hexaploid wheat having 42 chromosomes with six groups of seven chromosomes each 2n=6x=42. Glutenin assign extensibility while gliadin provides viscosity to dough [2].Protein quality (glutenin and gliadin) is the inherent characteristic of the genotype while protein content is the manifestation of genotype, environment and their interaction [3].

Wheat flour impregnates unique visco-elastic properties to the dough when mixed with water. This provides special functional properties to dough to make it amenable to processing in to variety of food products such as bread, chapatti, biscuits and pasta. Each product demands unique physical and chemical requirements in wheat

grain. Therefore, wheat varieties have been classified in to different classes commercially in global wheat trade as per physical (hardness and bran colour) and chemical attributes (protein contents and quality) [4]. In India, no such commercial classes exist. However, it has been univocally reported that the both physical and

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chemical properties of wheat are inherently genotypic attributes, though they have been found varying over different zones of the country.

History, tradition and functional quality requisites make durum wheat ideally suitable for pasta. The uniform, amber-yellow colour with clean surface, good ribbing and resistance to mastication; typical aroma and pleasant taste are some of the requisite traits in pasta. These pasta characteristics are primarily warranted by inherent quality of raw materials. Given that protein plays cardinal role in defining pasta quality, it seems virtually certain that some groups of gliadin and glutenin proteins are more important than others. Lately, attempts have been made to improve these protein groups using proven state of art technologies [5].

It is well known that the amber-yellow colour of semolina is attributed to natural pigments from the carotenoid and xanthophylls families. Though the yellow colour of these pigments is readily detected as brighter and more vivid, yet it is also well known that semolina with high pigment content do not always produce very yellow pasta. This is because carotenoid and xanthophylls have components that are impacted by several oxidizing enzymes. Sufficient content of β- carotene, absence of negligible yellow berry and peculiar quality of protein viz; gamma gliadin 45 is some of the prerequisite for *durum* wheat to be of good quality. Hard grain with high protein contents are some other attributes that make *durum* wheat amenable to value addition [6].

Wheat quality

Wheat grain contains for quality likewise fat (1.5-2.0%), cellulose (2.0-2.5%), minerals (1.8%) starch (60-68%), protein (6-21%) and vitamins. About 80 per cent of wheat protein contains gluten, which in turn comprises of glutenin and gliadin. Both these components are cardinal for imparting functional properties to dough [7].

Parameters of chapatti making quality

There are no specific standards for judging the quality of chapaties. It depends largely upon the dough characters which in turn depend upon the quality of wheat and flour.

Dough characters

Water absorption and sedimentation value

Water absorption capacity of flour is one of the important characters which determines the softness and pliability of chapatti. Usually water absorption of 68 per cent is desirable. At low moisture absorption, the chapatti become stiff and dry rapidly.

Sedimentation test is created on the fact that gluten protein of flour absorbs water and swellsubstantially when treated with lactic acid beneath certain conditions. Flour with sedimentation value of 30 to 37 ml is most suitable for chapaties making.

ISSN: 0971-1260
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Flour strength and pelshenke value

The strength of flour is determined by the content and physical properties of "gluten" the dough from weak flour is sticky and is difficult to roll and flatten in to chapaties. Chapatiesprepared from such flour have stiff texture and poor keeping quality. The dough from medium strong flour is strong, stretchable, elastic and non-sticky and is most suitable for chapatti making. Chapatti prepared from such flour have a soft, smooth and silk and pliable texture. These chapaties puff fully and rapidely and possess good keeping quality. Strong and very strong flour is not much suitable for chapati making. The chapatiesprepared from such flour are toughy and leathery [8]

Pelshenke value indicates the strength of gluten. It denotes the length of time required to start disintegration of dough ball in presence of yeast. Flours with pelshenke values between 100 and 150 minutes make good chapaties [9].

Several dough testing equipment's such as alveograph, mixograph, farinograph, amylograph, etc. are used to measure the rheological characters such as strength, stability, extensibility, elasticity, etc. the high strength and stability of dough impart undesirable toughness to the dough [10]. Verities have baking strength 15-20 cm2, combined with stability of 100 to 130 mm and extensibility of 20 to 27 mm are ideal for chapatti making.

Sugar content and diastatic activity

Sugar play important role in imparting switish test to chapaties. Chapaties made from flour with less than 2.5 per cent sugar score porely for palatability. Diastatic enzymes bring about breakdown of starch in to sugars. Unlike in bread making, fermentation dose not play a major role in making of chapaties. However, when the dough is allowed to rest for sometimes before chapaties are made, the diastatic enzymes act upon starch to produce sugars. Therefore, higher (more than 150 mg maltose / 10 g flours) diastatic activity is desirable for chapatti making purpose [11].

Protein content

Wheat containing 10 to 13 percent protein is suitable for chapatti making. High protein content makes the chapaties tough and leathery, while very low protein makes a crumbly type of chapaties having poor texture and keeping quality.

Wheat produced in the field passes through several hands before it actually consumed. The grower, processor, and consumer have different concept of quality characteristics of wheat [12]. The grower consider wheat quality as of good quality if;

a) Plant matures properly,

b) It gives good yield of clean wheat and

c) The harvested grains have good marketing qualities like appearance, color, high density, test weight, etc.

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The processor looks for the following characters in good quality of wheat:

a) Big and uniform size of kernel,

b) Clean seed, free from admixtures,

c) Moisture content of about 14 per cent and

d) Protein content to suit the particular end product.

Consumer requires a wheat product having palatability, good appearance, nutritive value and reasonable price. In many parts of the world, the consumer preference to wheat product having palatability, good appearance, high nutritive value and reasonable price. In many parts of the world the customer prefer to purchase the wheat instead of ready food products, grind and prepare food products. In this case, kernel appearance, color, size, damage, etc. are important characteristics of wheat quality [13].

Physical properties

Weight per unit volume

This is also callked as test weight and isone of the simplest and oldest criteria of wheat quality. It is generally expressed in terms of kg/hectoliter. More plump andmatures grains with low moisture content and uniform kernel shape give higher test weight and more yield of flour.

Thousand kernel weight

It is a function of kernel size and kernel density. The average value of thousand kernel weight for hard red weight is about 28gm, while that for durum wheat is higher i.e. about 35 gm.

Kernel hardness

The kernel hardness is an important factor in milling quality of wheat. Hard wheats yield more flour with less starch damage. Hard wheatare larger and heavier and have higher specific gravity than the soft wheat.

Impurities

Impurities present in wheat grains adversely affect the quality. Generally, the impurities in wheat include weed seeds, other cereal grains, plant residues, rodent's excreta, insects, mites, mud, dust, nails, nuts [14].

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Chemical properties

Moisture Content

Moisture content is one of the utmostprecariousfactor that define quality of wheat. Level of 14% moisture in wheat is desirable. Above this level, the grain are prone to attack by insects and microorganism and get damaged. And low moisture content, the grain tends to be brittle and break during commercial handling operations. The presence of broken kernels in large proportions reduce the quality. Moisture content is important while expressing the result of chemical analysis. The values for different constitute shoe considerable variations if the moisture content is not constant. It is therefore, more appropriate to express the results on moisture free on dry weight basis [15].

Conclusion:

Wheat quality is relative conception and is generally judged by its suitability for a particular end use. Wheat suitable for one type of product may be quite unsuitable for another. The quality of wheat be contingent upon a complex number of factors relating to growth, milling and the end-product.Wheat has a special place in food security and economy of a big country like India. Wheat researchers had been successful to maintain steady growth in enhancing production and productivity. The contentment of fulfilling food demand of a large and growing population has urged the researchers to target similar accomplishments in end-product quality of this staple crop. It has become imperative to improve grain quality of wheat not only for domestic food product of maximum usage i.e. chapati but also to meet requirements of baking industry and global trading to boost-up exchequer of the nation. End-product quality is highly complex in wheat and depends upon number of traits, genetic make-up and response to the environment.

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ISSN: 0971-1260
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