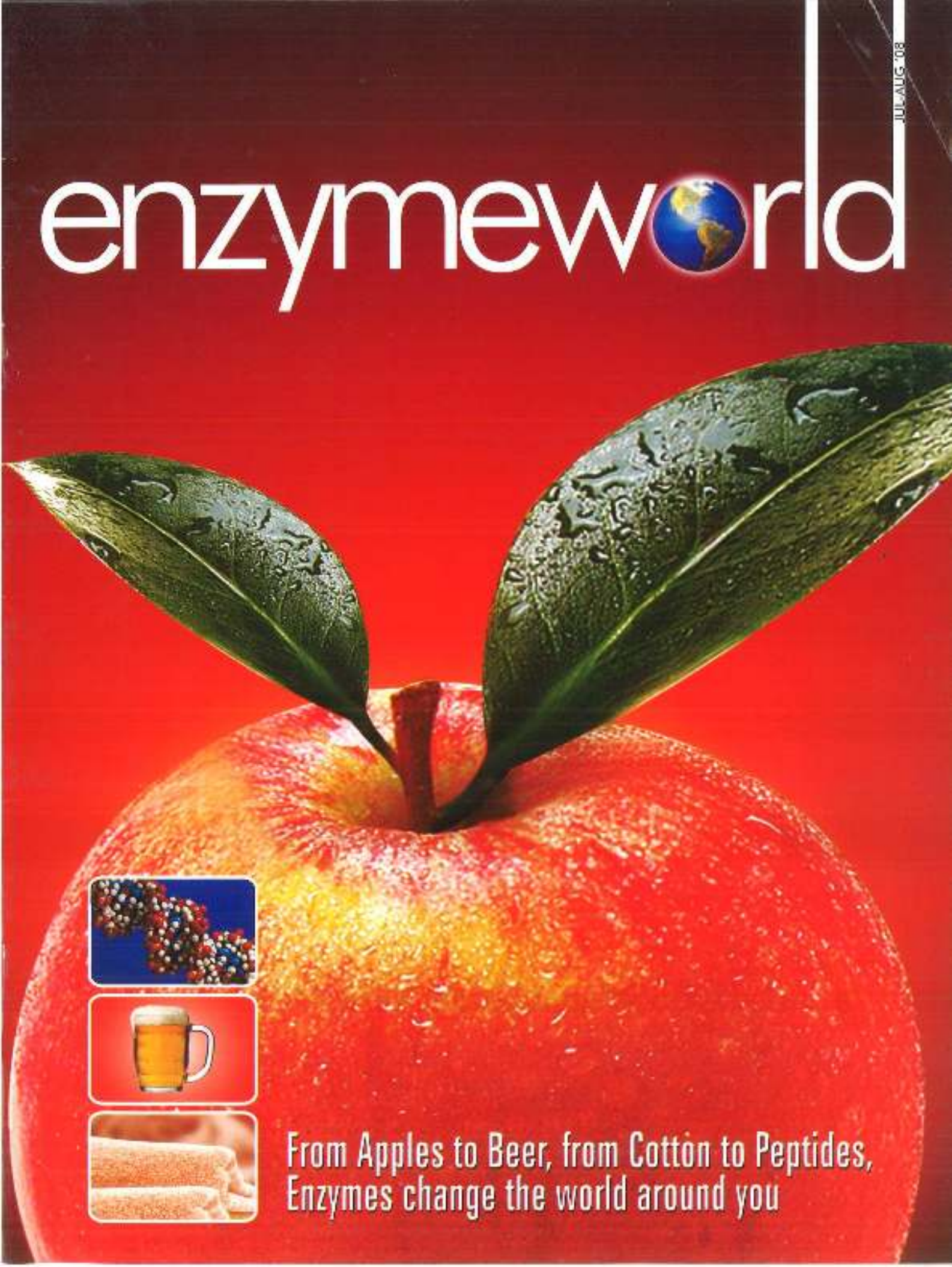
enzymeworld

JUL/AUG '08



From Apples to Beer, from Cotton to Peptides,
Enzymes change the world around you

CONTENTS

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Or write to us *EV@enzymeindia.com*
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EDITORIAL

Dear Friends,

From August 8th through the 24th, the world will meet in Beijing, China for the 2008 Olympic Games. It is an exciting time for athletes and fans of athletics. It is the one time we can all cheer for our home country athletes and at the same time admire the accomplishments of athletes from every country. For a very brief 17 days, we can watch, enjoy, cheer and celebrate as a world community.

In this issue of Enzyme World, we will cover the practical applications of enzymes in such diverse topics as processing apple juice; beer maturation; the bioscouring of grey cotton without polluting the environment; and finally, an important advancement for feed enzymes in the form of a Bioactive Protein Peptide System. In future issues, we will continue to provide a diverse range of applications where enzymes provide a solution. We hope each issue of Enzyme World will provide useful enzyme solutions for you.

Enzymes in Processing Apple Juice:
Fruit juice production, especially apple juice, is an essential segment of the beverage industry. The difficulties of this process are solved with the right enzymes. Issues like increasing yield, controlling clarity, sweetness and shelf life are all important factors that enzymes can solve. Therefore, manufacturing fruit juice in a cost-effective manner requires a significant contribution from the right kind of enzymes.

SEBmature® L: The Brewer's Choice for Maturation
Maturation is an important step in the Brewing. The aroma and flavor depend on this very time consuming step. Beer maturation mostly involves the removal of the buttery flavored diacetyl. Diacetyl is both produced by yeast and reabsorbed by them if adequate time is given for maturation. SEBmature® L can significantly speed up the maturation process. SEBmature® L is an alpha acetolacte decarboxylase enzyme, which effectively converts diacetyl into a tasteless and odorless compound, acetoin. The result is a faster maturation time and a better tasting beer.

Ecofriendly Pretreatment of Knits – Dollarisation:
Bioscouring is an important step in removing non-cellulosic impurities from grey cotton. Unfortunately, the typical process uses highly alkaline chemicals like caustic soda, soda ash, silicate and soaping agents are used. These agents not only damage the cotton structure, but the process itself results in a significant amount of pollution in the form of wastewater as well as high energy costs. The

AET Knit Pretreatment Package provides an ecofriendly solution that is both energy saving and cost effective.

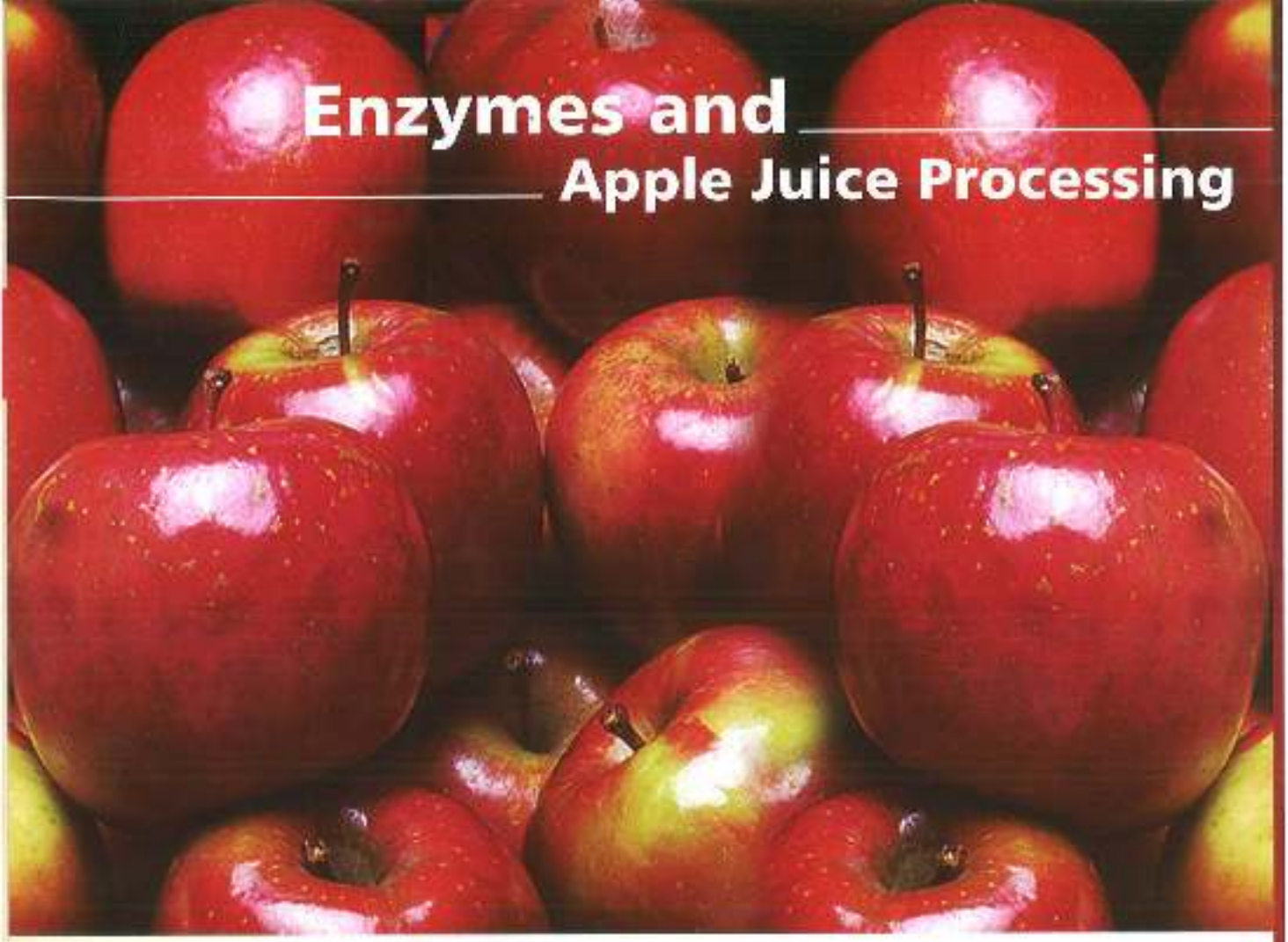
Bioactive Protein Peptide System™ (BPPS™)
Bioactive peptides are specific polypeptides that have a positive impact on physiological functions that influence health. The BPPS™ System may positively affect the cardiovascular, digestive, immune and nervous systems aside from the nutritional benefits. The BPPS™ System is now part of the delivery system of the feed enzymes and enzyme blends from Advanced Enzymes and Specialty Enzymes.

Ask the Enzyme Experts
Finally, the editorial staff at Enzyme World is pleased to announce a new department, "Ask the Enzyme Experts." This new department is an opportunity for you, the reader, to ask questions about how enzymes are used in your industry. Our team of enzyme experts will promptly respond to your questions. In addition, selected questions will be answered in upcoming issues of Enzyme World. Simply forward your questions via email to ***EW@enzymeindia.com*** and you will receive an email response and you may even see your question and response in the next issue of Enzyme World.

The SEB Group of Companies, Advanced Enzymes and Specialty Enzymes, are devoted to providing innovative enzyme solutions through the research and development of products that support the many different industries we serve. The goal of Enzyme World is to be a resource to manufacturers, providing practical, ecologically responsible information on the use of enzymes in every day production operations.

Be well,

Mike Smith



Enzymes and Apple Juice Processing

Fruit juice production is an essential segment of the beverage industry throughout the world and apple juice is the most popular juice over all. To the average person, fruit juice production is a simple concept, just squeeze and collect the juice. As with most things, the process is much more complex, especially when processing several tons at a time. Other issues such as increasing yield, controlling clarity, sweetness and shelf life are all important factors for juice processors. Therefore, manufacturing fruit juice in a cost-effective manner requires significant technical expertise at every step in the process.

There are many variables to consider. These range from choosing the right kind of press to how early harvest apples differs from late harvest or stored apples. Other issues include how to maintain a consistent level of sweetness and clarifying the final product.

Nutrition Facts:

- One medium apple produces ¾ cup or 6 oz of apple juice.
- One medium apple produces ½ cup of applesauce.
- 1-¼ apple produces one serving of apple juice (8 oz. or 240 ml) = 120 calories.
- The average person worldwide eats 50.8 pounds of apple products a year. About 37% is consumed as fresh apples and 63% is in processed products (juice, sauce, etc.).
- 51% of processed apples go for juice and cider. Other uses include dried fruit, frozen, fresh apple slices, canned applesauce and vinegar.

Harvest

The time of harvest depends on what part of the world you reside. In the U.S., apples are harvested in the Fall. Apples must be tested for "maturity" to determine if they're ready to be picked. Apples that are harvested too early may taste sour or starchy, and apples harvested too late may be soft and mealy. The

criteria for determining maturity include (1) sugar content (2) firmness (3) seed (4) skin color. Apples are still predominantly picked by hand, though some growers now use some mechanical methods.

Processing Apple Juice

Typical Processing Procedures for Apples:

1) Visual inspection: looking for mold, spray residue, etc. Cut or misshapen apples are okay for juice.

2) Washing: Apples are then water-washed by various methods for 10 to 45 minutes. Processors sometimes add chlorine dioxide, hypochlorite or other chlorine compounds to control microbial buildup in re-circulated water. Some washing includes physical scrubbers, which can actually reduce wash time. The extensive washing procedures effectively remove external surface dirt and topical agrochemical residues (pesticides).

3) The Mash: From the washers, the apples are chopped up by a grinder, apple mill or a "hammer mill" and turned into apple mash. To produce a highly pressable mash, it should not be ground too fine, stirred or heated above 35°C (95°F). When treated with pectinases, the temperatures range is kept mild, from 20-30°C and the reaction time is typically 30 to 120 minutes. This is in part to limit the hydrolysis of protopectin. Protopectin binds the cells and its hydrolysis weakens the fruit tissue, reduces its pressability and increases viscosity.

   Apples, like other fruit are high in pectin, especially in the core. **Pectin** is generally a straight chain polymer of D-Galacturonic acid with alpha 1,4-glycosidic linkage interspersed with some L-Rhamnose. It's found in cell walls of plants along with hemicellulose.

   The addition of Pectinase to the mill is very beneficial, especially for apples with a soft texture. Pectinases developed for apple mashes contain a high percentage of **pectin esterase** and **polygalacturonase** (aka pectin glycosidase). These enzymes dramatically reduce viscosity and the stickiness of the pomace, without affecting protopectin or reducing its pressability. Enzyme blends that include cellulase and hemicellulase activity can break down the cell wall and increase the over-all juice production by 5-10%. However, there can also be an increase in cellobiose (fines–small molecules). When blend of this type are used, the minimum amount should be used and for the shortest period of time. This will greatly reduce the production of cellobiose.

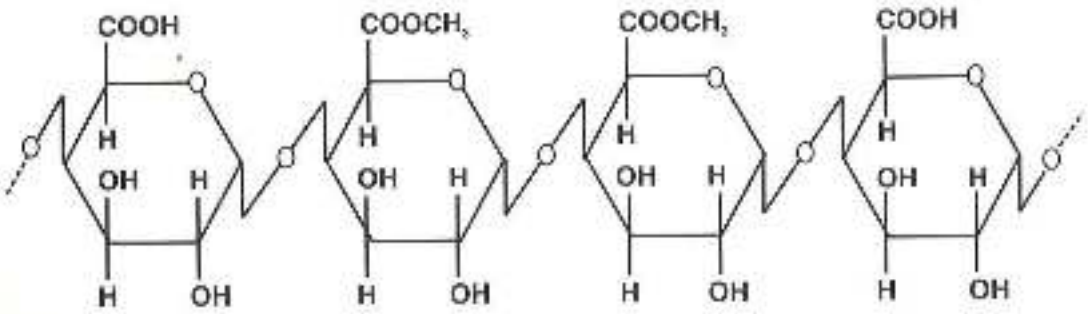
   - LiquiSEB-RL will provide significant pectinolytic activity as well as cellulase and hemicellulase side activity.
   - ClariSEB provides even stronger pectinase activity with very little cellulase and hemicellulase activity.

4) The mash is then sent to hydraulic presses that squeeze the mash to extract the juice. A single press usually yields only about 60 - 70% of the juice from fresh apples. Stored apples produce less juice and their untreated pomace tends to stick to the press. This is caused by protopectin hydrolysis that occurs during ripening, which separates cells and softens the fruit.

   Water is added to the pulp residue and it is completely expressed, usually with a horizontal press. The increase in juice volume isn't great, but the increase in sugar is significant. Normal juice is about 12 Brix. The second press sugar (apple sugar) can raise the juice to 12.3 to 12.5 Brix.

5) The apple juice is then pumped to holding tanks where it is filtered to remove sediment.

   If Pectinase was not added during mash, it can be added to the holding tanks. The use of a product like LiquiSEB or ClariSEB will reduce viscosity, prevent or reduce clogging of the filters and increase filtration rate. If LiquiSEB was used during the mash, ClariSEB could be used at this step to



further reduce viscosity and clarify the product.

LiquiSEB can also be used when the tanks are cleaned to help unclog filters.

6) The filtered juice is then pumped into clarification tanks. Hazy apple juice is desirable to some, especially in Japan. Others feel cloudy apple juice is more natural and is popular in health food stores and natural food markets. The cloudiness is due to pectin and/or starch. Unripe or early season apples have rather high levels of starch compared to mid and late season harvest apples.

   Again, LiquiSEB or ClariSEB will reduce the cloudiness from pectin.

   SEBamyl-L is an endo-amylase that will break down the starch into dextrins and maltose.

   SEBamyl-GL is an exo amylase that should eliminate the haze and produce additional glucose.

7) Once the juice is clarified, it is again filtered, though most companies now use Ultrafiltration*. The pore size in a microfilter is 0.1 and 10 μ** in diameter. The pore size for ultrafilter is between 0.001 and 0.1 μ. As a result, molecules as large as 10,000 daltons can clog these filters, slowing filtration rate and requiring expensive cleaning. If the juice was previously treated with pectinase and amylase enzymes, filtration will proceed properly and clogging should not occur.

8) The enzyme treated and twice-filtered apple juice goes to one of the two places:

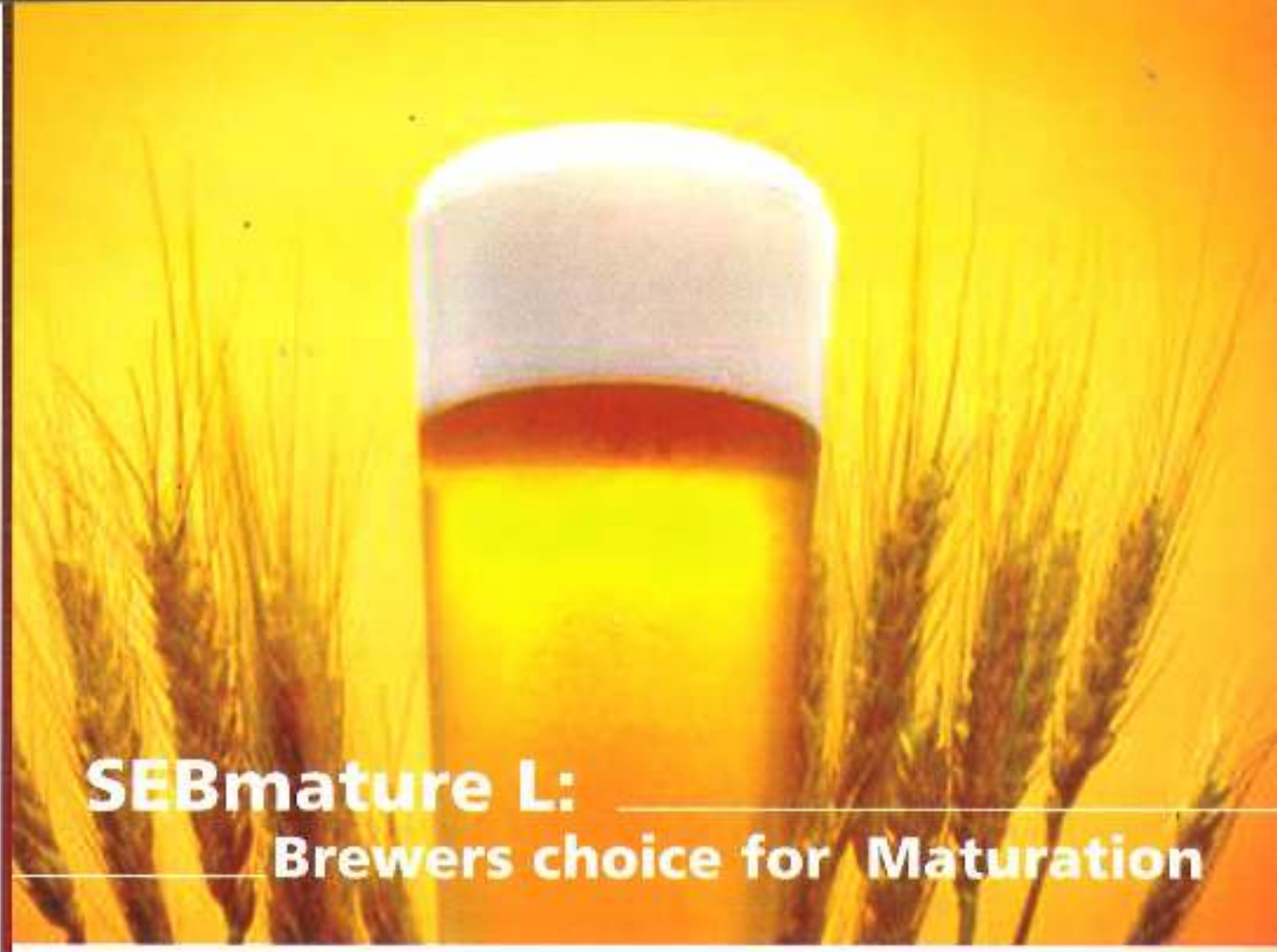
   (a) Directly to the bottling line – where it is pasteurized and filled into bottles and cooled.

   (b) Some apple juice is sent to concentrators where much of the water is removed to make a thick concentrate, which is typically 70 Brix. This is then stored cold in sanitized stainless steel tanks to wait to be bottled at any time.

Labeling

In most countries, enzymes used in food and juice processing are considered processing aids, not food additives. As a result, they are usually not required on the label. However, you must check the labeling requirements of your own country.

As this brief description illustrates, juice processing is complex. If you have questions about juice processing in your plant, Please contact info@specialtyenzymes.com or info@enzymeindia.com. Either or both will be happy to help you select the correct mix of enzymes for your production process.



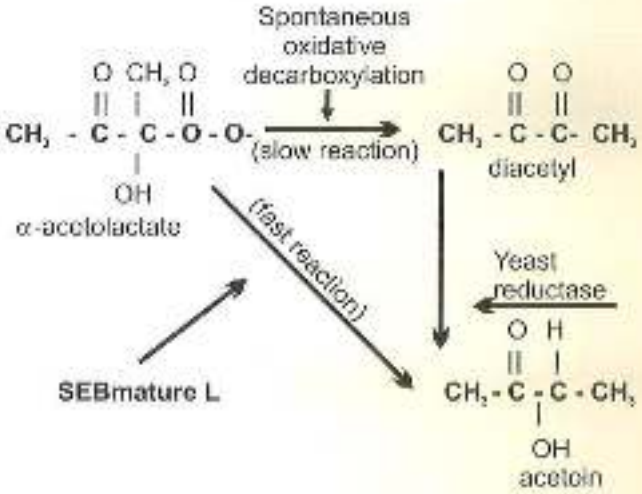
SEBmature L:
Brewers choice for Maturation

For centuries, a great secret has been revealed to man–the bubbly elixir known as beer. The natural ingredients undergo a series of simple yet fascinating processes to convert them into one of the world's most popular beverages. It is not coincidental that alcoholic beverages have been given the distinctive appellation "spirits," alluding to the fact that these beverages seem to magically emerge from the natural ingredients, as if they have been assisted by spirits.

The different steps of **beer** making are **malting, roasting, brewing, fermenting & maturation.**

However **maturation** is one of the most important steps in the Beer-making process in the sense that beer aroma and flavor profile depends on this step. Also as it is the most time consuming step and ties up capital in the stored beer, beer maturation is the bottleneck in beer production.

Beer maturation mostly involves removal of Diacetyl. Diacetyl is a by-product produced early in the fermentation, and then most of it is reabsorbed by the yeast and gets reduced to flavorless compounds later on. However different Yeast strains differ markedly in their diacetyl reduction ability. The aroma of diacetyl resembles that of butter or butterscotch. The flavor threshold for diacetyl is about 0.15mg/L.



The precursor of diacetyl is alpha-acetolactate. This hydroxyl acid precursor is produced as intermediate in the biosynthesis of the amino acid valine. Once in beer, the alpha-acetolactic acid spontaneously but slowly undergoes oxidative decarboxylation to

yield the diketones. This is a temperature dependent process and hence it proceeds very slowly under beer maturation conditions. The diketones then pass back into the yeast cell where they are reduced, to acetoin and butanediol which are much less intense in taste and aroma.

In the conventional beer manufacturing process this maturation stage takes place for about 5 to 7 weeks. Such long maturation time becomes real bottleneck during peak season for beer production.

Quite a few processes have been developed to shorten the fermentation, maturation and stabilization times. One such process is the so called "Pressure Fermentation" in which the fermentation and maturation are speeded up to about 7 days by carrying out these process at 14-18°C. However, beers produced by this process can develop yeasty taste and an overall less favorable flavor.

The other alternative process is referred to as "Cold Fermentation-Warm Maturation" process. In this process, the fermentation is done under traditional cold conditions where as the maturation is carried out at 18 to 22° C. This reduces the maturation time to about 7 to 14 days. Though this process produces high quality beer, the energy cost of this process is very high as the subsequent stabilization is done under traditional cold conditions.

In yet another variation of process to reduce maturation time, the yeast is removed from green beer by centrifugation and the green beer is reacted with high density yeast cells in a bioreactor and subjected to anaerobic heating to 90° C. This reduces all diacetyl to acetoin in a couple of hours. This is followed by conventional maturation. This process is too expensive and

develops yeasty off taste in the beer.

The most promising process to reduce the maturation time appears to be the process of "addition of acetolactate decarboxylase" to the pitched wort. Addition of acetolactate decarboxylase during fermentation prevents the formation of diacetyl, by converting α acetolactate directly to acetoin, leading to reduction of maturation time.

In order to be able to use this enzyme technology, fortunately for the brewing industry, the enzyme α acetolactate decarboxylase has been available commercially for quite some time now.

The use of alpha aceto lactate decarboxylase is in a way indispensable for breweries located in fast growing beer markets such as India. α acetolactate decarboxylase would enable these breweries to meet the ever increasing market demands with high quality beer, without increasing the production capacity.

Advanced Enzyme Technologies Ltd, in its commitment to serve the brewing industry with customized solutions, offers SEBmature L, an acetolactate decarboxylase for reducing the maturation time in brewing of beer.

Ecofriendly Pretreatment of Knits - Dollarisation

Need of Bioscouring:

Grey cotton in any form needs to be scoured in order to remove natural and foreign impurities as well as make the fabric hydrophilic. Scouring removes wax and fat from the cuticle, pectin, hemicellulose and proteinaceous matter from the primary wall.

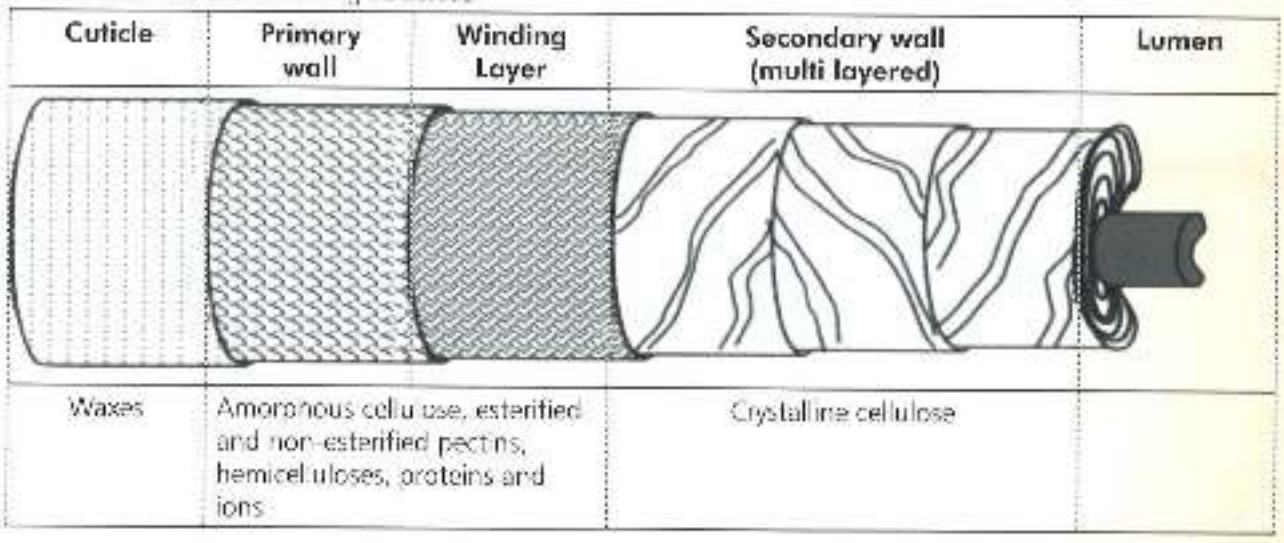
Today, highly alkaline chemicals like caustic soda, soda ash, silicate and soaping agents are used for scouring to remove the non-cellulosic impurities from cotton. The use of 3-4% NaOH on cotton fabric not only results in damage to the cotton structure, but the intensive rinsing and added acid needed for neutralization results in a significant increase in the volume of effluent. These hazardous chemicals result in an increase in COD (chemical oxygen demand), BOD (biological oxygen demand) and TDS (total dissolved solids) in the wastewater. Furthermore, they attack the cellulose fibers leading to a heavy loss of both strength and weight in the fabric. The net result is low quality cotton, a polluted environment and the high usage of energy and water.

Need of Ecofriendly Knit Pretreatment Package:

In process, one can obtain better results using the AET Knit Pretreatment Package. Enzymes, which are substrate specific, only attack natural and foreign impurities, resulting better quality cotton and an ecofriendly environment.

COTTON STRUCTURE:

Cotton fiber has the following structure:



Composition of dry matured cotton is as follows:

Constituents	Composition(%)	
	Whole fibre	Outer layer
Cellulose/xyol-glucan	94	51
Waxes Pectic substanoes	0.6 - 1.3 0.9 - 1.2	14 9
Protein (Nitrogen substances)	0.6 - 1.3	8
Ash	1.2	3
Organic acids	0.8	-
Others	1.4	12

The outer layer, which includes the cuticle, primary and winding layer, contains the impurities we want to remove. The goal is to achieve quality hydrophilic cotton fabrics. Removing the impurities without damaging the fabric is only possible with enzymes, which are substrate specific.

AET KNIT PRETREATMENT PACKAGE:

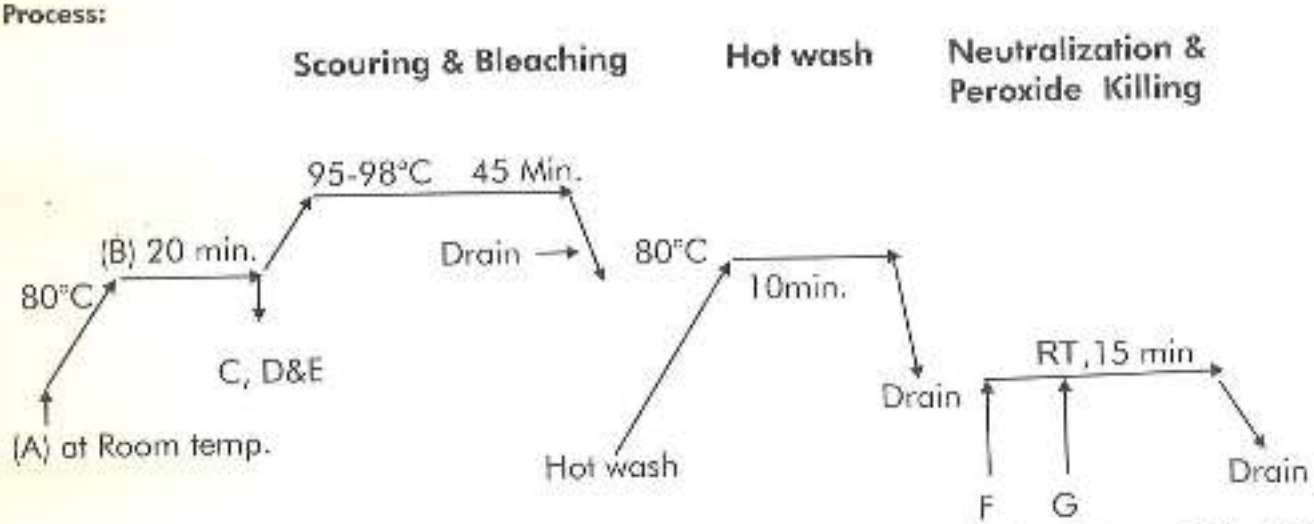
Products:

Addscour PCLP : Blended Enzymes

Sebaux WDS : Dispersing Agent

Seawet CP : Wetting Agent

Process:



Charge Sebwet CP - 0.3% (A) at room temperature. Raise temperature to 80°C and dose Addscour PCLP - 0.8% (B). Maintain temperature for 20 minutes. Charge Sebaux WDS - 0.25% (C), Hydrogen Peroxide – 1.5% (D) & Soda Ash – 1% (E). Raise temperature to 95°C, Boil for 45 min, Drain, Hot wash, Acetic Acid (F), Adoox 10L (G) Neutralization & Peroxide Killing

RESULTS ANALYSIS:

A) Drop Test

Method	Time (sec)
Alkaline scouring	Instant
Bio scouring	Instant

B) Sink Test

Method	Time (Sec)
Alkaline scouring	1-2 Sec
Bio scouring	Instant

C) Weight Reduction

Method	Percentage
Alkaline scouring	7.89%
Bio scouring	3.42%

D) Whiteness

Method	Whiteness Index
Alkaline scouring	67.78
Bio scouring	67.23

E) Residual Bath

Parameter	Plane water	Bio scoured Bath	Alkaline Bath
T.D.S	200 ppm	2100 ppm	>7080 ppm
Hardness	55 ppm	100 ppm	>250 ppm
pH	7.4	10.0	> 13

F) Pectin content

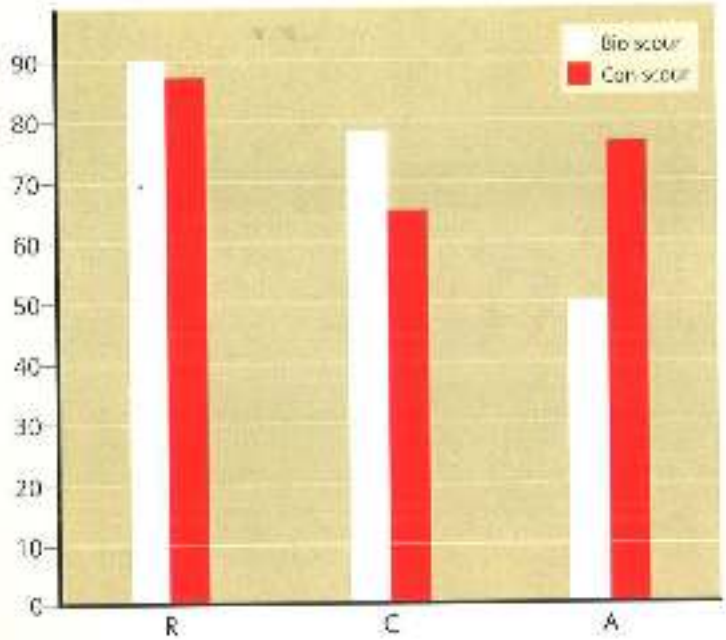
Residual Pectin (%) – Ruthenium Red Test	
Alkaline scouring (Conventional)	8.8%
Bio Scouring	0.2%

G) COD

COD values (mg O_2/l) Residual bath	
Alkaline scouring (Conventional)	3850
Bio Scouring	1632

H) Dye exhaustion

- Reactive dye exhaustion increase by 4%
- Cationic increase by 20%
- Anionic reduce by 34%



R- Reactive dye
C Cationic dye
A – Anionic dye

I) Finishing

Application	Alkaline scouring	Bio scouring
Wicking height	14.6 cm	15.6 cm
Drop test	1 sec	Instant
Sink test	2-3 Sec	Instant

J) Pilling

Method	Pilling Scale
Alkaline scouring	1-2
Bio scouring	2-3

Conventional Scouring Process :

NaOH	:	3%
Wetting agent	:	0.5%
Sequestering agent	:	0.5%
Lubricant	:	0.3%
H2O2	:	1.5%
Stabilizer	:	0.3%
Temp	:	95°C
Time	:	60 Min

Advantages:

- High Tensile strength (in yarn CSP increased by 50% as compared to convertional process)
- Produces lower weight loss
- Is less pollutant to the wastewater, 50% reduction in COD, BOD and TDS
- Lower energy consumption
- Less aggressive for the fabric and for the environment
- Provides a safe working environment
- Softer cotton textiles
- Reduced water consumption
- Complete removal of non-cellulosic impurities
- Uniform and high absorptive pretreated goods
- High accessibility of cotton substrate for dyestuff uptake

Costings : Total Cost for 100 Kg Fabric

- **Alkaline scouring**

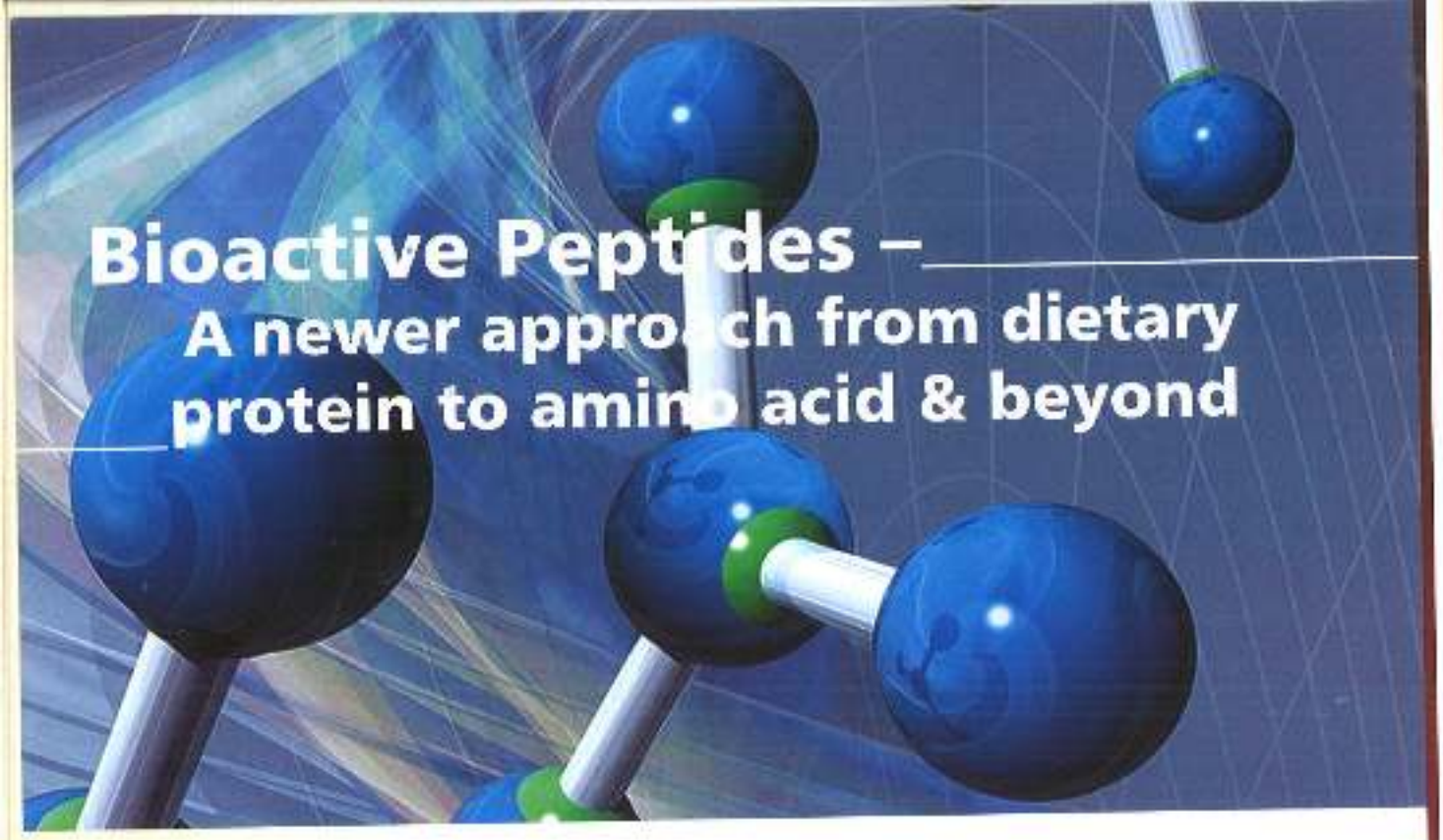
No.	Process	INR (Rs.)	$$$
1.	Various Chemical Costs	571.00	14
2.	4% Fabric weight loss more	700.00	17
3.	Finishing	500.00	12
4.	100% Risk in pollution	?	?
5.	Cotton quantity risk	?	?
	Total Cost	**1771 + ? ?**	**43 + ? ?**

- **Bio scouring –**

		INR (Rs.)	$$$
1.	Package Cost	521.00	12
2.	Finishing Cost	250.00	6
3.	Other costs	0.00	0.00
	Total Cost	**771**	**18**

Conclusion on Bioscouring Package from AET:

- Obtain 100% Organic processed cotton
- Savings upto Rs. 100000.00 or $ 2300 / day for unit with production of 10 MT / Day or equal to savings upto 40% , will vary from unit to unit and fabric to fabric
- Additional dye pickup, darker and brighter shades
- Cotton is known for its comfort, 100% comfort maintained and Customer happiness maintained.
- 100% risk free process
- No pollution.



Bioactive Peptides – A newer approach from dietary protein to amino acid & beyond

The word protein is derived from the Greek proteios, meaning primary or foremost. The proteins are the key to the life process. There is a huge diversity of proteins. The key to the structure of different proteins is the group of relatively simple molecules, the amino acids. Over the years, research in animal nutrition has moved from describing the protein content of feedstuffs to the amino acid content, to the absorption and metabolic utilization of amino acids. Recently, attention has turned toward describing peptides that can be derived from food proteins during natural digestion. These peptides have quite potent activity and significant biological roles.

Bioactive peptides have been defined as specific protein fragments that have a positive impact on body functions or conditions and may ultimately influence health. Upon oral administration, bioactive peptides, may affect the major body systems like the cardiovascular, digestive, immune and nervous systems other than the nutritional upliftment. The beneficial health effects may be classified as antimicrobial, antioxidative, antithrombotic, antihypertensive, antimicrobial or immunomodulatory.

The activity of these bioactive or bio-functional peptides is based on their inherent amino acid composition and sequence. The size of active sequences may vary from two to twenty amino acid residues. The sequence is protected from proteolysis because of its high hydrophobicity and the presence of proline residues. Most of the peptides are known to have multifunctional properties e.g., peptides from the sequence 60-70 of β-casein show immunostimulatory, opioid and ACE inhibitory activities. Other examples of the multifunctionality of peptides include the as1-casein fraction 194-199 showing immunomodulatory and ACE-inhibitory activity, the opioid peptides α- and β-lactorphin also exhibiting ACE inhibitory activity and the calcium-binding phosphopeptides (CPPs), which possess immunomodulatory properties.

Bioactive peptides have been shown to elicit behavioural, hormonal, immunological, neurological, vasoregulatory and nutritional responses in animals.

Moreover, effects on food palatability, gut function and the digestive processes have also been documented.

Production of bioactive peptides

Bioactive peptides are inactive within the sequence of the parent protein and can be released in three ways: (a) enzymatic hydrolysis by digestive enzymes, (b) food processing and (c) proteolysis by enzymes derived from microorganisms or plants.

Enzymatic hydrolysis

The cleavage of latent bioactive peptides from proteins

Source	Peptide	Function
Casein, lactoferrin	Casokinins	ACE inhibition
	casecidin, lactofericin and B-lactoglobulin	antimicrobial activity
	Casoplatelins	anti-thrombotic activity
casein, whey and lactoferrin hydrolysates	Caseinphosphopeptide	Calcium absorption and immunomodulatory activity

normally occurs during digestion by pepsin and pancreatic enzymes (trypsin, chymotrypsin, carboxy and aminopeptidases), producing active peptide fragments in the gastrointestinal tract of the animal. The physiological effects of bioactive peptides depend on their ability to reach their target sites intact, which may involve absorption through the intestinal epithelium prior to travel to the peripheral organs.

Many of the known bioactive peptides have been produced ***in vitro*** using gastrointestinal enzymes, usually pepsin and trypsin. ACE-inhibitory peptides and CPPs, for example, are most commonly produced by trypsin. Other digestive enzymes and different enzyme combinations of proteinases – including alcalase, chymotrypsin, pancreatin, pepsin and thermolysin as well as enzymes from bacterial and fungal sources – have also been utilized to generate bioactive peptides from various proteins.

Food & Feed Processing

The structural and chemical changes that occur during the processing of proteins may result in the release of bioactive peptides. In particular, heat and/or alkali treatment can generate additional inter-and intramolecular covalent bonds that are resistant to hydrolysis.

Microbial fermentation

Bioactive peptides can be generated by the proteolytic activities of the strains of bacteria e.g. ***Lactobacillus helveticus, Lactobacillus delbrueckii*** ssp. ***bulgaricus, Lactobacillus plantarum, Lactobacillus rhamnosus, Lactobacillus acidophilus, Lactococcus lactis, Streptococcus thermophilus*** used in the manufacture of fermented products. The proteolytic system of lactic acid bacteria (LAB) is well characterised. This system consists of a cell wall-bound proteinase and a number of distinct intracellular peptidases, including endopeptidases, aminopeptidases, tripeptidases and dipeptidases. Extracellular proteinases cause degradation of casein into oligopeptides. The longer chain oligopeptides may be a source of bioactive peptides when further degraded by intracellular peptidases of lysed-lactic acid bacteria.

Physiological effects of bioactive peptides

Most research to date has investigated about bioactive peptides and numerous bioactive peptides have been identified. Bioactive peptides have been shown to elicit behavioural, hormonal, immunological, neurological, vasoregulatory and nutritional responses in animals.

Moreover, effects on food palatability, gut function and the digestive processes have also been documented.

For the feed industry, immune enhancement and antibiotic activity are properties of bioactive peptides that would appear to hold immediate promise for commercial exploitation.

The immunostimulatory and antimicrobial properties of various bioactive peptides have been reviewed in detail. A peptide from trypsin hydrolyzed milk has been shown (in vitro) to stimulate the phagocytosis of sheep red blood cells by murine peritoneal macrophages and to enhance the resistance of mice to Klebsiella pneumoniae infection when given intravenously. A peptide from casein has shown protective action in mice against Staphylococcus aureus and Candida albicans. The same peptide has been shown to safeguard sheep and cows against mastitis when injected into the udder at levels comparable to those observed with standard antibiotic treatment. The orally

administered casein-derived casomorphins are able to regulate gastrointestinal motility and affect the rate of gastric emptying and exert anti-diarrhoeal action.

Quite in addition to their bioactive role, protein peptides, are useful nutritional supplies of amino acids. Recently, protein peptides have become available as feed ingredients for animals, especially young pigs & poultry. These protein peptides have some specific nutritional properties. Firstly, the digestibility and availability of the amino acids from such peptides is very high and there is unlikely to be any limitation due to incomplete digestion and absorption. The uptake of peptides is based on a H+ -coupled mechanism, and if the peptides proportionally more (compared to intact protein) amino acid is absorbed in the peptide form, less energy may be expended by the animal in absorption. Peptides are known to be taken up into the portal blood more rapidly than the comparable intact protein, which may mean that there is less microbial degradation of key limiting amino acids.

Other functional roles

Recent studies have shown that peptides with antioxidative properties can be released from caseins by hydrolysis with digestive enzymes and by proteolytic LAB (Lactic Acid producing Bacteria). Most of these have been shown to possess free radical -scavenging activities and to inhibit non-enzymatic lipid peroxidation . In the future, antioxidative peptides may find applications as ingredients in different fields, e.g. in the prevention of oxidation in fat-containing foodstuffs, cosmetics and pharmaceuticals. More research is needed to demonstrate if peptides produced during fermentation can prevent oxidative damage *in vivo* also.

Hypocholesterolemic peptide (Ile-Ile-Ala-Glu-Lys) from the tryptic hydrolysate of β-lactoglobulin suppresses cholesterol absorption by Caco-2 cells *in vitro* and elicited hypocholesterolemic activity *in vivo* upon oral administration.

Future perspectives for bioactive peptides

Bioactive peptides would appear to have the potential to offer specific health benefits to animals health as well as the end consumers. While there is a need for further basic research to clarify why these peptides have physiological effects, commercial products containing bioactive peptides are now commercially available. Food and pharmaceutical companies are actively considering how to exploit bioactive peptides in both human as well as animal nutrition.

Bioactive peptide preparations have the potential to be used in the formulation of functional foods and as potent drugs having well defined pharmacological effects. Application of enrichment protocols such as membrane processing and chromatographic isolation may also be an area of future interest in the extraction of potent biofunctional peptides from fermented dairy products and their subsequent utilization as functional food ingredients.

Advantages of Bio-Active Peptide

- Higher nutritional value and bioavailability as compared to crude protein
- Provide higher digestibility and absorption & retention of nitrogen
- Preserves muscle glycogen store
- Promotes high muscle weight gain
- Enhances the body production of glutathione, a natural anti-oxidant which supports the immune system of the body

Bangladesh – The fastest garment economy after China

AETL has been actively focusing on offering Ecosafe Solutions to Textile Industry since last year and half. As part of its awareness drive and business expansion plan, in addition to India, AETL started focusing on Bangladesh market since April 2007.

"It took about a year to understand market and market needs for AETL to offer CUSTOMISED COST EFFECTIVE ECOSAFE PACKAGE TO BANGLADESH TEXTILE INDUSTRY. After doing successful test marketing of AETL package solutions, AETL decided to hold AWARENESS seminar in Bangladesh. This programme was held at Dhaka Sheraton hotel recently. The ceremony witnessed a whopping turnout of 275 people against an invited number of 150.

Speaking at the program, Mr. C I Rathi, Managing Director, AETL addressed a very prestine crowd which included chief guests, Fazlul Hoque, President BKMEA and Shafique Rahman, President of BGWIOA, as well as Dipak Roda, General Manager Marketing and Abhinay Parab, International Marketing Manager – Bangladesh. Mr. Rathi said, "We spent close to eight months understanding this market and have designed customized solutions as per the primary market needs. We are very encouraged by the fact that our products have done exceedingly well which shows that the textile industry is welcoming eco friendly solutions."

Mr. Humayun Kabir, General Manager, Washing, Laundry Industries said "I have been using AETL products for denim processing since last six months. I found these products very user friendly and excellent in apolications and cost effective too"

With a projected growth of about 22%, Bangladesh is slated to be the fastest garment industry after China. With such a heavy growth in the industry some of the hazardous materials commonly used in processing of garments decrease the amount of dissolved oxygen in water thus affecting the water. Hence, there is a growing need for safer eco-friendly solutions.

AETL has decided to establish formulation and manufacturing facilities in Bangladesh under joint ventures with local partners phase wise.

Current Events

InBev Acquires Anheuser-Busch

July 14, 2008, Anheuser-Busch Companies (ABC) agreed to a $70 per share bid from InBev to create the world's largest brewer. This ends what had become an acrimonious fight involving threats of lawsuits and attempts to unseat the board of directors at ABC. Belgian brewer InBev SA offered $52 billion for the acquisition ABC, no doubt hoping to use ABC's marketing power to make Budweiser and Bud Light brands into a global powerhouses, as they are in the USA. The acquisition will give InBev, the maker of Beck's, Bass and others, half the U.S. beer market and a fifth of those in China and Russia.

InBev Chief Executive Carlos Brito, will retain his position. ABC executives are expected to remain in the new company, and marketing plans remain unchanged, so far. ABC CEO, August Busch IV will move into a non-executive role, but will be on the new company's board.

DSM Acquires Valley Research

July 11, 2008 Royal DSM N.V., headquartered in the Netherlands, announced the acquisition of Valley Research Inc. of South Bend Indiana, U.S.A. Valley Research Inc., is a privately held biotechnology company that offers a broad range of enzymes products that are used in dietary supplements, dairy, juice and wine industries. President of Valley Research, Art Sears, will remain as an advisor in the food enzyme division. Terms of the acquisition have yet to be disclosed.

The Biofuel Controversy

Biofuel and its role in creating significant increases in food prices continues to be controversial. There is little doubt that it is, at the very least, partially true. Government policies and the demand for renewable energy have created a kind of win-lose relationship between biofuel producers and those that use corn for food and feed.

The ever-increasing demand for biofuel, particularly ethanol from corn, has had a number of effects on grain supply and demand. Expanded production of ethanol from corn, in particular, has increased the demand for corn. As a result, corn production is shifting away from its use as food and feed and moved to the more profitable production of ethanol. The net result is a large increase in commodity prices for corn. Rising corn prices, in turn, are affecting other grains. For example, higher prices for corn (a significant food and feed staple) cause many consumers to buy less corn and switch to rice and wheat. On the other hand, higher corn prices make corn more profitable to grow, causing some farmers to shift from rice and wheat cultivation to corn. These demand and supply side-effects have tended to increase the price of rice and wheat and other crops. As yet, the promise of other sources of renewable energy are still taking a backseat to bioethanol production.

QUIZ

Question 1: Enzymes are
a) Carbohydrates
b) Celluloses
c) Proteins
d) None of the above

Question 2: Indigestible complex fibers are
a) Protein
b) Carbohydrate
c) Hemicellulose
d) Fat

Question 3: The enzyme responsible for bioplishing,
a) Amylase
b) Bromelain
c) Cellulase
d) None of the above.

Question 4: In the alcohol production the component required is,
a) Proteins
b) Carbohydrates
c) Fat
d) None of the above

Question 5: The red colour developed in sugar analysis is read at
a) 600 nm
b) 540 nm
c) 280 nm
d) 900 nm

Question 6: The plaques formed in the blood vessels are dissolved by
a) Pectinase
b) Cellulase
c) Pepsin
d) Nattokinase.

Question 7: In pediatric diarrhea doctor recommends
a) Saccharomyces Boulardii
b) Cellulose
c) Pectin
d) None of Above

Question 8: Dehairing of leather is facilitated by
a) Cellulase
b) Protease
c) Amylase
d) Pectinase

Question 9: The enzyme which helps in bio-bleaching is
a) Cellulase
b) Amylase
c) Xylanase
d) None of Above

Question 10: The enzyme used in the burns treatment
a) Lactase
b) Amylase
c) Papain
d) Pectinase.

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