Studies on flavoring agent in foods

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Flavour is very important for the acceptabilityof foods, medicines, confectioneries and drinks. Informationrelating to aroma components of froi ts and fruit products has shown great advances over the pasttwenty years largely due to analytical developmentsin the field of gas chromatography.Flavour in fruits and fruit products, as well asall foods and beverages, results from the combinedeffect of their constituents on the taste and olfactDryorgans. Whenconsidering flavouring components, it isusual to segregate them into volatiles and non volatiles,the former giving rise to aroma and the latter totaste sensations, but it must be rememberedthat thisdivision is not clearly cut.The percentage of different constituents of fruitsdiffers with the degree of ripening, fertilization andenvironmental conditions prevailing during growth andmaturation of fruits.Mature, ripe and over ripe guava and pear fruitswere choasen for this current studies to cover the wholeguava and pear season. Separation of flavouring materialsand their identification in the three degrees of maturitywere also studied.The effect of processing and storageon ascorbic acid, sugar content and total acidity weremonitired for one year.Following up develop in the volatile componentsthrough ripening, beside the distribution of thesevolatiles in different parts of fruits were achived.The volatile componentswere obtained by differentmethods to choose the best one.Ripening of pear fruits by storage under differenttemperatures was carried out. Influence of processingand storage on the volatile componentsof guava juiceand pear puree were investigated • Analysis of thefatty acid composition of ripe guava and pear fruitswaS obtained. Organoleptic evaluation was carried outfor mature, ripe ,over .ripe, processed and stored guavajuice and pear puree.The results of this study could be summarizedin the following :1- Both weight and size of fruits increase duringripening hence the maximum weight and size was observedat ripe stage, where the specific gravity was 1.006 and1.001 in guava and pear juice respectively. The maximumcontent of edible parts was obtained in the ripe stagein guava fruits, where the highest content ••••••obtainedin the over ripe stage in pear fruits.2-R1pe.guava fruits have a high content of totalacidity, total soluble solids, total sugars, carotenoids,protein and fat. It has also a low contnt of ash ; fibersand total solids comparedto mature stage. Over ripe fruitscontain high ascorbic acid, moisture and carotenoids.Its flesh also is characteri zed by excellent flavour andcolour in ripe fruits.3- An increase was noticed in ascorbic acid, carotenoides,moisture, protein, fat and ash in ripe stageof pear. Also a slight increase was noticed in totalsoluble soli4s, total sugars and fibers in over ripestage of pear fruits.4- Ripe fruits had the highest content of ester,carbonyl compound,oxygenated terpenes and limonenethat reveal strong fruity aroma for suava and pearfruits.5- Ascorbic acid content of fresh white guava juicewhich was 85.2 mg./1OOgm. decreased gradually afterprocessing and storage for 12 months in all· treatments.- 170 -Ascorbic acid content in fresh pear puree was 4.5and 5.2 mg/lOOgm.in peeled and unpeeled fruits respectively.After processing it decreased to 2.57 and2.97 mg/lOOgm., and atter storage for one year the lossof ascorbic acid was 19.84 % and 16.16 % respectively.A slight increase was noticed in reducing sugarswhile a s light decrease was observed in non reducingones through storage of guava juice and pear puree.The titrable acidity (calculated as citric acid)decrease to about half during processing, due to additionof water and sugar. The ti trable acid! ty of guava wasstable 1n juices stored at 5°0. and - 15°0 ., whilethose stored at room temperature showed a slight decreasefor guava juice and pear puree after storage for oneyear.6- Gas liquid chromatograPhic technique was usedto separate and identify volatile components of mature ,ripe and over ripe fruits.a. 40 components were identified in guava fruitsrepresent ing difi’ erent groups of

organi c compounds, 12aldehyes (3.methyl butana1 , pentanal ; 2-methyl propanal;hexanal ; 2-hexenal ; heptanal ; octanal 1 nonanal, 1decanal ; benzalliehyde ; hendecanal ;and dodecanal.)• 13 esters (methyl butyrate ; ethyl butyrate ;methyl valerate ; methyl hexanoate , linalyl acetate;methyl heptanoate ; methyl octanoate; benzyl acetate;B-phenyl ethyl acetate I methyl cinnfUDate,ethyl dodecanoate; ethyl tetradecanoate and cinnamyl acetate.)& 10 alcohols (3-hexanol ; 2-hexanol; 3-methyl-l-pentenol;hexanol ; 3-octanol ; heptanol ; octanol; B-phenyl ethylalcohol ; 0< -terpeniol and benzyl alcohol.) & ;-Ketones(B-ionone ; 3-heptanone and 3-Octanone.) Be and 2-hydrocarbons(caryophellene and P-methyl styrene .).The components responsible for the fragrant flavourare the ester componentswhich have the highest concentration(44.94 %) for ripe fruits and the lowest for themature ones (;3.68 %) • This result indicates the.tripefruits has the best taste and odour. concerning alcohols.the great variation in their concentration was observedfor the ripe fruits as it reached 27.33 % while for theover ripe ones it waS8.95 % ·b. QUalitative and quantitative changes in aromacompoundsas a result of ripening were studied in pearessence. }4 componentswere identified, 4 aldehydes(Propanal ; 3-methyl but anal ; decanal and 2,4undecandenal).20 esters (propyl acetate ; butyl acetate ; amyl acetate;hexyl acetate ; methyl heptanoate ; methyl octanoate ;ethyl octanoate ; octyl acetate ; ethyl trans , 2-octanoate; metb~l' cis: 4-decenoate ; ethyl decanoate ; ethylcis: 4-decenoate : methyl trans: 2-decenoate ; methyltrans:2:cis:4-decadienoate ; ethyl trans :2-decenoate ;methyl trans:2:trans:4-decadienoate ;ethyl-}-hydroxyoctanoate ; ethyl trans:2cis:4-decadienoate ; ethyltrans:2:trans:4-decadienoate and methyl dodecanoate.),8 alcohols (~-hexanol; propyl alcohol ; 2-hexanol; I-hexenol;linalool; ~-octanol; n-heptanol; andn-octanol.)and 2 ketones (}-octanone and 3-nonanone.).Both short chain am long chain fatty acid estersplay a significant role in the ripening of fruits. Theseresults agree with those mentioned by creveling andJennings (1970).7_ a. Enters of guava give the fruit its characteristicfruity aroma.Theyreached 42.27 % in the whole fruitand ~2.02 ,J in pulp. Cinnamylacetate increased to 10.46 %in pulp because other componentsoverlap its characteristicodour. The ketonic compoundsreached 21.49 % inseeds and 14.84 % in peels.b. Results of pear fruits explain that most of thecharacteristic flavour of pear developed mainly in peels,- l7~ -while pulp have only sweet flavour. The short chainalcohols were 4.27 % ;4.14 % ;0.46 ~ and 2.26 % forthe whole fruit; pulp ; peels and cores respectively.This explains that the peel has lowest concentrationof alcohols of a grassy flavour. The percentage ofalcohols in seeds maycontribute to the pressenceof lipid in seeds which maybe oxidized to g1ve thoseshort chain alcohols.8-a. Extraction by organic solvents depends uponthe polarity of both, solvent used and flavour components.Using ether, aliphatic aldehydes showedthehighest concentration in guava fruits. Also by using pentane,alcohols had the highest concentration. Using ether toextract the distillate of guava juice gave the highestconcentration of esters (44.94 %)Falcohols (2?}} %)and the lowest content of aldehydes (6.51%).b. Steam distillation of flavour componentsofpear fruits followed by ether extraction is better thaneven direct ether extraction which shows a good resultthEn pentane or (ether: pentane) extraction.9-a.. Both chemical and physical methods c-n be used for reducing enzymeaction •Guavafruits treated withmethanol before distillation have the highest concentrationof aldehydes while the untreated ones have thelowest concentration as they were 53.}% and 6.51 %r~spectively. On the other hand fruits treated withmethanol had ester, ketone and alcohol content of 22.37%,5 •.7rw. and 9.06 % while those untreated contained 44.94 %,21.21 % and 27.33 % respectively.b. Pear fruits treated with methanol as enzyme inhibitor before distillation to obtain aroma components,has the highest concentration of short 9l1d longchain esters which had the characteristic flavour ofpear fruits.10-a. Esters amountedto 30.88 % in pulp and 6.49% in serum of guava juice. This indicates that flavourof guava juice is due mainly to ester content. Thereforeit could be mentioned that centritugation mayoffer avaluable supplementary technique for isolation offlavour compoundsfrom guava juice .•b.' In case of pear juice all the organolepticallyimportant compoundsare oxygenated and mainly appear inthe serum. These results are in accordance with theestablished commercial practice of clarifying apple juiceto obtain a product of improved appearance.11- Low temperature of 5°C encouraged the productionof unsaturated fatty acid esters rather than saturatedones • Onthe other band, storage at roomtemperaturedecreased unsaturated long chain fatty acid esters inrelation to their saturated homologs. Cold storage ofpear fruits is the

best condition to obtain good tasteand flavour.l2-a. Anobvious increase in the deonal concentrationwhich maYbe due to the reversible reaction between estersand water to form alcohols and acids.b. The concentration of low boiling point componentsdecreased, a f act which might be due to escape of lowboiling point componentsduring the processing, thenother componentsincreased.c. The concentration of the volatile componentsofcanned guava juice stored at roomtemperature in aluminiumfoil containers and stored at 5°0 especially enhancedthe aldehydes by the addition of sucrose. Cold storage ofaluminium. foil. containers of guava juice stored at50C. and - 15°C. showedhigh content of B-iononeat 10.77 % and 2}.86%respectively.d. Processing of pear puree under different treatmen't"s revealed a wide variation in the concentration ofindividual volatile components of pear.The storage of pear puree at room temperaturefor one year lead to a high change in the concentrationof alcohols in most stored samples , which maybe due tothe begining of fermentaion through the browning reactions.13-a_01eic, linoleic and linolenic acids formedthe major part of the fatty acids (56 %) • This explainsthe forming of 3-alkanones, long chain aldehydes and longchain esters which are believed to be derived from 0<. -B-oxidation of these unsaturated fatty acids and alaoexplains the variation observed by storage or by anothertreatment for guava fruits.b. On the other hand the unsaturated acids,namly oleic, linoleicand linolenic constitute the major part of the acids,(62 • 54~&) • This may explain the presence and tbe changeof the unsaturation isomers decodienoates. The developmentof these decadienoates are due too{ &. B-oxidatlonof these unsaturated fatty acids during ripening of thefruits or under technical processingl4-a. Changes that occurred in the chemicalproperties and flavouring materi ala of guava and pearfrui ts during ripening affected the taste and aroma offruits • The acceptability grade of guava and pear fruitswas unacceptable in mature stage. It· increased to excellent(natural) in ripe stage, then decreased to acceptable inthe over ripe ones.b. It could be seen that the most apparent differenceis the average desication time required between samplesprepared under different conditions and stored at differenttemperatures. This range from about 6 lIlon'tbs for samplesstored at roomtemperature to about 9 months', for those storedat 5°C and ~15°C before the development of detecteableorganoleptic change.c. Pear puree processed from ripe fruits under alldifferent treatments and stored at roomtemperature hadlonger relative storage durability. Samples prepared withdifferent treatments and stored at roomtemperature for12 months had the sameloss of score-As generally this effect was enhanced by increasingtemperature of storage, which resulted in reduction ofacceptability grade of guava juice and pear puree, fromvery good to acceptable in most saJIlples of this work.