

7. LAMPIRAN

7.1. Sampel Kalibrasi dan Validasi

(0,0,0)	(0,0,1)	(0,0,2)	(0,0,3)	(0,0,4)	(0,0,5)	(0,0,6)	(0,0,8)
(0,1,0)	(0,1,1)	(0,1,2)	(0,1,3)	(0,1,4)	(0,1,5)	(0,1,6)	(0,1,8)
(0,2,0)	(0,2,1)	(0,2,2)	(0,2,3)	(0,2,4)	(0,2,5)	(0,2,6)	(0,2,8)
(0,3,0)	(0,3,1)	(0,3,2)	(0,3,3)	(0,3,4)	(0,3,5)	(0,3,6)	(0,3,8)
(0,4,0)	(0,4,1)	(0,4,2)	(0,4,3)	(0,4,4)	(0,4,5)	(0,4,6)	(0,4,8)
(0,5,0)	(0,5,1)	(0,5,2)	(0,5,3)	(0,5,4)	(0,5,5)	(0,5,6)	(0,5,8)
(0,6,0)	(0,6,1)	(0,6,2)	(0,6,3)	(0,6,4)	(0,6,5)	(0,6,6)	(0,6,8)
(0,8,0)	(0,8,1)	(0,8,2)	(0,8,3)	(0,8,4)	(0,8,5)	(0,8,6)	(0,8,8)
(1,0,0)	(1,0,1)	(1,0,2)	(1,0,3)	(1,0,4)	(1,0,5)	(1,0,6)	(1,0,8)
(1,1,0)	(1,1,1)	(1,1,2)	(1,1,3)	(1,1,4)	(1,1,5)	(1,1,6)	(1,1,8)
(1,2,0)	(1,2,1)	(1,2,2)	(1,2,3)	(1,2,4)	(1,2,5)	(1,2,6)	(1,2,8)
(1,3,0)	(1,3,1)	(1,3,2)	(1,3,3)	(1,3,4)	(1,3,5)	(1,3,6)	(1,3,8)
(1,4,0)	(1,4,1)	(1,4,2)	(1,4,3)	(1,4,4)	(1,4,5)	(1,4,6)	(1,4,8)
(1,5,0)	(1,5,1)	(1,5,2)	(1,5,3)	(1,5,4)	(1,5,5)	(1,5,6)	(1,5,8)
(1,6,0)	(1,6,1)	(1,6,2)	(1,6,3)	(1,6,4)	(1,6,5)	(1,6,6)	(1,6,8)
(1,8,0)	(1,8,1)	(1,8,2)	(1,8,3)	(1,8,4)	(1,8,5)	(1,8,6)	(1,8,8)
(2,0,0)	(2,0,1)	(2,0,2)	(2,0,3)	(2,0,4)	(2,0,5)	(2,0,6)	(2,0,8)
(2,1,0)	(2,1,1)	(2,1,2)	(2,1,3)	(2,1,4)	(2,1,5)	(2,1,6)	(2,1,8)
(2,2,0)	(2,2,1)	(2,2,2)	(2,2,3)	(2,2,4)	(2,2,5)	(2,2,6)	(2,2,8)
(2,3,0)	(2,3,1)	(2,3,2)	(2,3,3)	(2,3,4)	(2,3,5)	(2,3,6)	(2,3,8)
(2,4,0)	(2,4,1)	(2,4,2)	(2,4,3)	(2,4,4)	(2,4,5)	(2,4,6)	(2,4,8)
(2,5,0)	(2,5,1)	(2,5,2)	(2,5,3)	(2,5,4)	(2,5,5)	(2,5,6)	(2,5,8)
(2,6,0)	(2,6,1)	(2,6,2)	(2,6,3)	(2,6,4)	(2,6,5)	(2,6,6)	(2,6,8)
(2,8,0)	(2,8,1)	(2,8,2)	(2,8,3)	(2,8,4)	(2,8,5)	(2,8,6)	(2,8,8)
(3,0,0)	(3,0,1)	(3,0,2)	(3,0,3)	(3,0,4)	(3,0,5)	(3,0,6)	(3,0,8)
(3,1,0)	(3,1,1)	(3,1,2)	(3,1,3)	(3,1,4)	(3,1,5)	(3,1,6)	(3,1,8)
(3,2,0)	(3,2,1)	(3,2,2)	(3,2,3)	(3,2,4)	(3,2,5)	(3,2,6)	(3,2,8)
(3,3,0)	(3,3,1)	(3,3,2)	(3,3,3)	(3,3,4)	(3,3,5)	(3,3,6)	(3,3,8)
(3,4,0)	(3,4,1)	(3,4,2)	(3,4,3)	(3,4,4)	(3,4,5)	(3,4,6)	(3,4,8)
(3,5,0)	(3,5,1)	(3,5,2)	(3,5,3)	(3,5,4)	(3,5,5)	(3,5,6)	(3,5,8)
(3,6,0)	(3,6,1)	(3,6,2)	(3,6,3)	(3,6,4)	(3,6,5)	(3,6,6)	(3,6,8)
(3,8,0)	(3,8,1)	(3,8,2)	(3,8,3)	(3,8,4)	(3,8,5)	(3,8,6)	(3,8,8)
(4,0,0)	(4,0,1)	(4,0,2)	(4,0,3)	(4,0,4)	(4,0,5)	(4,0,6)	(4,0,8)
(4,1,0)	(4,1,1)	(4,1,2)	(4,1,3)	(4,1,4)	(4,1,5)	(4,1,6)	(4,1,8)
(4,2,0)	(4,2,1)	(4,2,2)	(4,2,3)	(4,2,4)	(4,2,5)	(4,2,6)	(4,2,8)
(4,3,0)	(4,3,1)	(4,3,2)	(4,3,3)	(4,3,4)	(4,3,5)	(4,3,6)	(4,3,8)

(4,4,0)	(4,4,1)	(4,4,2)	(4,4,3)	(4,4,4)	(4,4,5)	(4,4,6)	(4,4,8)
(4,5,0)	(4,5,1)	(4,5,2)	(4,5,3)	(4,5,4)	(4,5,5)	(4,5,6)	(4,5,8)
(4,6,0)	(4,6,1)	(4,6,2)	(4,6,3)	(4,6,4)	(4,6,5)	(4,6,6)	(4,6,8)
(4,8,0)	(4,8,1)	(4,8,2)	(4,8,3)	(4,8,4)	(4,8,5)	(4,8,6)	(4,8,8)
(5,0,0)	(5,0,1)	(5,0,2)	(5,0,3)	(5,0,4)	(5,0,5)	(5,0,6)	(5,0,8)
(5,1,0)	(5,1,1)	(5,1,2)	(5,1,3)	(5,1,4)	(5,1,5)	(5,1,6)	(5,1,8)
(5,2,0)	(5,2,1)	(5,2,2)	(5,2,3)	(5,2,4)	(5,2,5)	(5,2,6)	(5,2,8)
(5,3,0)	(5,3,1)	(5,3,2)	(5,3,3)	(5,3,4)	(5,3,5)	(5,3,6)	(5,3,8)
(5,4,0)	(5,4,1)	(5,4,2)	(5,4,3)	(5,4,4)	(5,4,5)	(5,4,6)	(5,4,8)
(5,5,0)	(5,5,1)	(5,5,2)	(5,5,3)	(5,5,4)	(5,5,5)	(5,5,6)	(5,5,8)
(5,6,0)	(5,6,1)	(5,6,2)	(5,6,3)	(5,6,4)	(5,6,5)	(5,6,6)	(5,6,8)
(5,8,0)	(5,8,1)	(5,8,2)	(5,8,3)	(5,8,4)	(5,8,5)	(5,8,6)	(5,8,8)
(6,0,0)	(6,0,1)	(6,0,2)	(6,0,3)	(6,0,4)	(6,0,5)	(6,0,6)	(6,0,8)
(6,1,0)	(6,1,1)	(6,1,2)	(6,1,3)	(6,1,4)	(6,1,5)	(6,1,6)	(6,1,8)
(6,2,0)	(6,2,1)	(6,2,2)	(6,2,3)	(6,2,4)	(6,2,5)	(6,2,6)	(6,2,8)
(6,3,0)	(6,3,1)	(6,3,2)	(6,3,3)	(6,3,4)	(6,3,5)	(6,3,6)	(6,3,8)
(6,4,0)	(6,4,1)	(6,4,2)	(6,4,3)	(6,4,4)	(6,4,5)	(6,4,6)	(6,4,8)
(6,5,0)	(6,5,1)	(6,5,2)	(6,5,3)	(6,5,4)	(6,5,5)	(6,5,6)	(6,5,8)
(6,6,0)	(6,6,1)	(6,6,2)	(6,6,3)	(6,6,4)	(6,6,5)	(6,6,6)	(6,6,8)
(6,8,0)	(6,8,1)	(6,8,2)	(6,8,3)	(6,8,4)	(6,8,5)	(6,8,6)	(6,8,8)
(8,0,0)	(8,0,1)	(8,0,2)	(8,0,3)	(8,0,4)	(8,0,5)	(8,0,6)	(8,0,8)
(8,1,0)	(8,1,1)	(8,1,2)	(8,1,3)	(8,1,4)	(8,1,5)	(8,1,6)	(8,1,8)
(8,2,0)	(8,2,1)	(8,2,2)	(8,2,3)	(8,2,4)	(8,2,5)	(8,2,6)	(8,2,8)
(8,3,0)	(8,3,1)	(8,3,2)	(8,3,3)	(8,3,4)	(8,3,5)	(8,3,6)	(8,3,8)
(8,4,0)	(8,4,1)	(8,4,2)	(8,4,3)	(8,4,4)	(8,4,5)	(8,4,6)	(8,4,8)
(8,5,0)	(8,5,1)	(8,5,2)	(8,5,3)	(8,5,4)	(8,5,5)	(8,5,6)	(8,5,8)
(8,6,0)	(8,6,1)	(8,6,2)	(8,6,3)	(8,6,4)	(8,6,5)	(8,6,6)	(8,6,8)
(8,8,0)	(8,8,1)	(8,8,2)	(8,8,3)	(8,8,4)	(8,8,5)	(8,8,6)	(8,8,8)

7.2. Coding Matlab

7.2.1. Root Mean sum of Square Error (RMSE)

```
clear
```

```
home
```

```
% Coding Matlab ini Untuk plottong RMSE vs Variabel latent data data kalibrasi
```

```
% glucose sucrose fructose - Skripsi
```

```
% created by Nadya, February 2021
```

```
data=xlsread('RMSE_PLS_2der.xlsx');
```

```
N=data(:,1);
```

```
kalG=data(:,2);
```

```
kalS=data(:,3);
```

```
kalF=data(:,4);
```

```
valG=data(:,5);
```

```
valS=data(:,6);
```

```
valF=data(:,7);
```

```
figure(1)
```

```
ploth=plot(N,kalG,'-ok',N,valG,'-or');
```

```
set(gca,'LineWidth',1,'FontSize',12,'GridColor','k','GridLine',':');
```

```
set(ploth,'MarkerSize',8,'LineWidth',1);
```

```
pbaspect([1 1 1])
```

```
xlabel('Jumlah variabel laten (N)')
```

```
ylabel('RMSE')
```

```
axis([0 9 -0.05 0.25])
```

```
grid on
```

```
figure(2)
```

```
ploth=plot(N,kalS,'-ok',N,valS,'-or');
```

```
set(gca,'LineWidth',1,'FontSize',12,'GridColor','k','GridLine',':');
```

```
set(ploth,'MarkerSize',8,'LineWidth',1);
```

```
pbaspect([1 1 1])
```

```
xlabel('Jumlah variabel laten (N)')
```

```
ylabel('RMSE')
```

```
axis([0 9 -0.05 0.25])
```

```
grid on
```

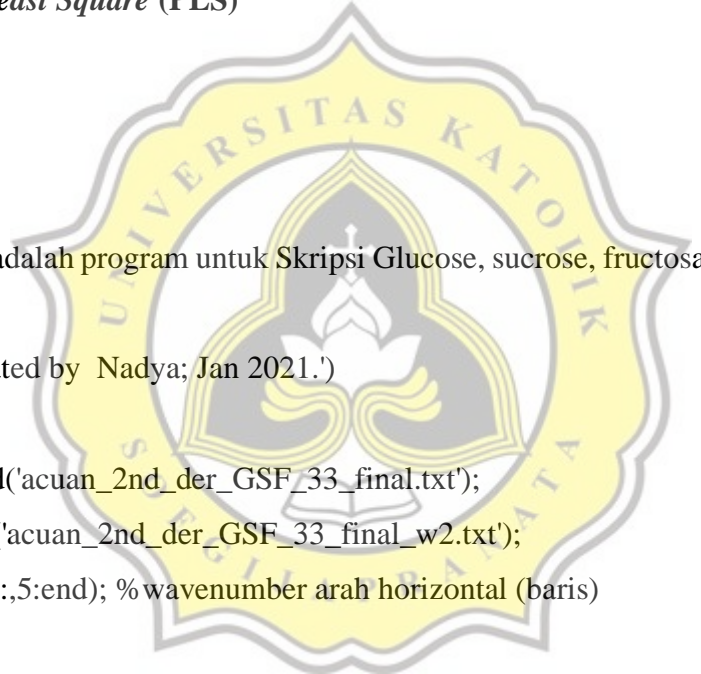


```

figure(3)
ploth=plot(N,kalF,'-ok',N,valF,'-or');
set(gca,'LineWidth',1,'FontSize',12,'GridColor','k','GridLine',':');
set(ploth,'MarkerSize',8,'LineWidth',1);
pbaspect([1 1 1])
xlabel('Jumlah variabel laten (N)')
ylabel('RMSE')
axis([0 9 -0.05 0.25])
grid on

```

7.2.2. *Partial Least Square (PLS)*



```

clear;
home;

disp('Ini adalah program untuk Skripsi Glucose, sucrose, fructosa Gula kelapa dan
Lontar ');
disp('created by Nadya; Jan 2021.')

data=load('acuan_2nd_der_GSF_33_final.txt');
w2=load('acuan_2nd_der_GSF_33_final_w2.txt');
X2=data(:,5:end); % wavenumber arah horizontal (baris)

Q=data(:,2:4);
G=Q(:,1);
S=Q(:,2);
F=Q(:,3);

%MENGHITUNG PLS -----

N=4

```

```

[n,p] = size(X2);

[Xloadings,Yloadings,Xscores,Yscores,betaPLSk,PLSPctVar,mse] =
plsregress(X2,Q,N,'CV',10);
yfitPLS_kal = [ones(n,1) X2]*betaPLSk;

a = [1:n]'; b = num2str(a); c = cellstr(b);

figure(1)
scatter(G,yfitPLS_kal(:,1),'ob');
axis([-0.1 1 -0.1 1]);
pbaspect([1 1 1])
grid on
% exportgraphics(gcf,'cal_glucose.eps','ContentType','vector')
%
% figure(2)
scatter(S,yfitPLS_kal(:,2),'ob');
axis([-0.1 1 -0.1 1]);
pbaspect([1 1 1])
grid on
% exportgraphics(gcf,'cal_sucrose.eps','ContentType','vector')
%
% figure(3)
scatter(F,yfitPLS_kal(:,3),'ob');
axis([-0.1 1 -0.1 1]);
pbaspect([1 1 1])
grid on
% exportgraphics(gcf,'cal_fructose.eps','ContentType','vector')
%
delta=yfitPLS_kal-Q;
delta=abs(delta);

```

```

PRESS_kal=sum(delta);
RMSE_kal=PRESS_kal/length(G)
%
% %-----
% %calculating validation
datavalidasi=load('sample_uji_2nd_der_GSF.txt');

% omit data
p=[494 461 453 452 450 392 330 318 263 261 257 253 241 240, ...
  239 200 199 198 149 117 116 96 95 70 69 67 66 64 63 62 60, ...
  58 56 55 54 52 51 48 47 46 45 25 19];

for i=1:length(p)
    datavalidasi(p(i),:)=[];
end

dataval=datavalidasi(:,5:end);
Qv=datavalidasi(:,2:4);
Gv=Qv(:,1);
Sv=Qv(:,2);
Fv=Qv(:,3);

[q,p] = size(dataval);
yfitPLS_val = [ones(q,1) dataval]*betaPLSk;

figure(4)
scatter(Gv,yfitPLS_val(:,1),'or');
axis([-0.1 1 -0.1 1]);
pbaspect([1 1 1])
grid on
% a = [1:length(Gv)]'; b = num2str(a); c = cellstr(b);

```




```
% dx = 0.01; dy = 0.01; % displacement so the text does not overlay the data
points
```

```
% text(Gv+dx, yfitPLS_val(:,1)+dy, c);
```

```
% exportgraphics(gcf,'val_glucose.eps','ContentType','vector')
```

```
figure(5)
```

```
scatter(Sv,yfitPLS_val(:,2),'or');
```

```
axis([-0.1 1 -0.1 1]);
```

```
pbaspect([1 1 1])
```

```
grid on
```

```
% a = [1:length(Sv)]'; b = num2str(a); c = cellstr(b);
```

```
% dx = 0.01; dy = 0.01; % displacement so the text does not overlay the data
points
```

```
% text(Sv+dx, yfitPLS_val(:,2)+dy, c);
```

```
% exportgraphics(gcf,'val_sucrose.eps','ContentType','vector')
```

```
figure(6)
```

```
scatter(Fv,yfitPLS_val(:,3),'or');
```

```
axis([-0.1 1 -0.1 1]);
```

```
pbaspect([1 1 1])
```

```
grid on
```

```
% a = [1:length(Gv)]'; b = num2str(a); c = cellstr(b);
```

```
% dx = 0.01; dy = 0.01; % displacement so the text does not overlay the data
points
```

```
% text(Fv+dx, yfitPLS_val(:,3)+dy, c);
```

```
% exportgraphics(gcf,'val_fructose.eps','ContentType','vector')
```

```
delta=yfitPLS_val-Qv;
```

```
delta=abs(delta);
```

```
PRESS_val=sum(delta);
```

```
RMSE_val=PRESS_val/length(Gv)
```

```

TOT=sum(RMSE_val'); TOT=TOT';
RMSE_val=[0 RMSE_val, TOT];

%-----
%calculating data_uji
datauji=load('kelapa_lontar_2nd_der.txt');
[m,p] = size(datauji);
yfitPLS_uji = [ones(m,1) datauji]*betaPLSk;

total=sum(yfitPLS_uji'); total=total';
disp('No Urut G S F Total')
no_urut=[1:m]; no_urut=no_urut';
hasil=[no_urut,yfitPLS_uji,total];
hasil=[2*RMSE_val;hasil]

filename='hasil_uji_kelapa_lontar_PLS.xlsx';
xlswrite(filename,hasil)

figure(7)
plot(w2,dataval,'k');
axis([4000 6500 -4e-4 4e-4]);
pbaspect([1 1 1])
xlabel('Bilangan gelombang cm^{-1}')
ylabel('Transmitans / Bg^2')
grid on
exportgraphics(gcf,'target_PLS.eps','ContentType','vector')

```

7.2.3. *Principal Component Analysis (PCA)*

```

clear;
home;

disp('Ini adalah program untuk glucosa, sucrose dan fructose Kelapa Lontar ');
disp('created by Nadya; Okt 2020.')

```



```
data_matrix=xlsread('sampel_kelapa_lontar.xlsx','kelapa_lontar');
```

```
w=data_matrix(1,1:end); w=w'; w1=w(2:end);
```

```
X=data_matrix(2:end,1:end);X=X';
```

```
a = [1:44]'; b = num2str(a); c = cellstr(b);
```

```
dx = 0.00005; dy = 0.00005; dz=0.00005;
```

```
figure(1)
```

```
plot(w,X(:,1:23),'r',w,X(:,24:44),'b')
```

```
xlabel('Bilangan gelombang (cm-1)')
```

```
ylabel('Transmitans')
```

```
grid on
```

```
pbaspect([1,1,1])
```

```
%exportgraphics(gcf,'kelapa_lontar.eps','ContentType','vector')
```

```
X=sgolayfilt(X,3,11);
```

```
%normalisasi
```

```
bb=find(w>=6880); bb=bb(1); %6880 %4050
```

```
ba=find(w>=9350); ba=ba(1); %9350 %9400
```

```
[m,n]=size(X);
```

```
for i=1:n
```

```
    X(:,i)=X(:,i)-X(bb,i);
```

```
    X(:,i)=X(:,i)./X(ba,i);
```

```
end
```

```
figure(2)
```

```

plot(w,X(:,1:23),'r',w,X(:,24:44),'b')
xlabel('Bilangan gelombang (cm^{-1})')
ylabel('Transmitans ternormalisasi')
grid on
pbaspect([1,1,1])
%exportgraphics(gcf,'kelapa_lontar.eps','ContentType','vector')

```

```
%turunan pertama (remove background and baseline)
```

```

X1=diff(X);
w1=w(2:end);

```

```

figure(3)
plot(w1,X1(:,1:23),'r',w1,X1(:,24:44),'b')
xlabel('Bilangan gelombang (cm^{-1})')
ylabel('Transmitans / Bg')
grid on
pbaspect([1,1,1])
%exportgraphics(gcf,'1st_der_kelapa_lontar.eps','ContentType','vector')

```

```
%turunan kedua (improve resolution)
```

```

X1=sgolayfilt(X1,3,11);
X2=diff(X1);
w2=w(2:end-1);

```

```

figure(4)
plot(w2,X2(:,1:23),'r',w2,X2(:,24:44),'b')
xlabel('Bilangan gelombang (cm^{-1})')
ylabel('Transmitans / Bg^2')
grid on
pbaspect([1,1,1])

```

```

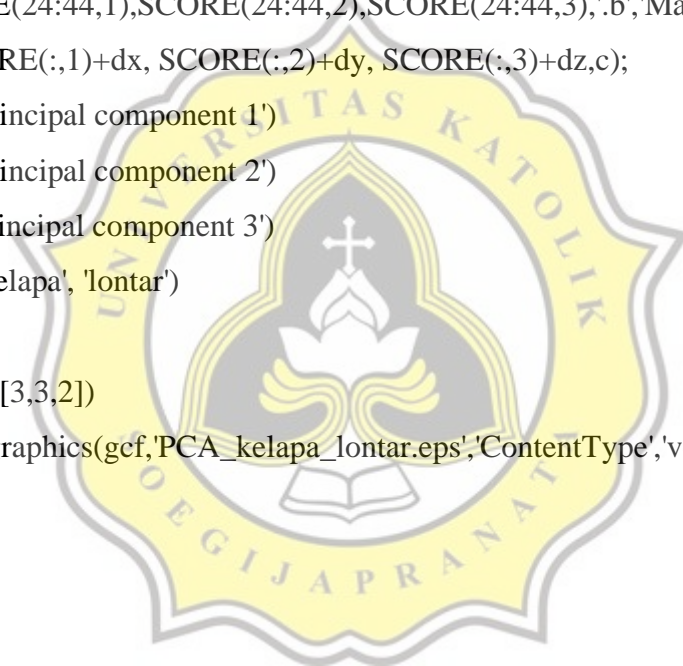
%exportgraphics(gcf,'2nd_der_kelapa_lontar.eps','ContentType','vector')

%MENGHITUNG PCA -----

X1=X1';
[COEFF, SCORE, LATENT, TSQUARED, EXPLAINED] = pca(X1);

figure(5)
plot3(SCORE(1:23,1),SCORE(1:23,2),SCORE(1:23,3),'r',...
       SCORE(24:44,1),SCORE(24:44,2),SCORE(24:44,3),'b','MarkerSize',12)
text(SCORE(:,1)+dx, SCORE(:,2)+dy, SCORE(:,3)+dz,c);
xlabel('Principal component 1')
ylabel('Principal component 2')
zlabel('Principal component 3')
legend('kelapa', 'lontar')
grid on
pbaspect([3,3,2])
%exportgraphics(gcf,'PCA_kelapa_lontar.eps','ContentType','vector')

```





5.5% PLAGIARISM
APPROXIMATELY

Report #13202965

PENDAHULUAN Latar Belakang Pangan merupakan sumber nutrisi yang dibutuhkan manusia dalam menjalankan aktivitas fisiologis dan mempertahankan keberlangsungan hidupnya. Salah satu nutrisi penting yaitu karbohidrat berperan untuk proses pembentukan energi. Glukosa merupakan senyawa pemanis yang diserap oleh tubuh dan masuk dalam darah kemudian merangsang hormon insulin. Glukosa, fruktosa, dan sukrosa terdapat pada sayur, buah, biji-bijian, dan produk olahan seperti roti, nasi, atau tepung-tepungan dengan komposisi yang berbeda. Menurut Sophi (Damayanti et al., 2012), konsentrasi fruktosa pada beberapa buah seperti jeruk yaitu 0,469%, pada apel 0,714%, pada kiwi dan anggur 1,303%, pada stroberi 1,222%, dan pada jambu 1,431%. Konsentrasi glukosa pada buah jeruk yaitu 0,454%, pada apel 0,468%, kiwi dan anggur 1,233%, stroberi 1,169%, dan pada jambu 1,286%. Konsentrasi sukrosa pada buah jeruk sebesar 1,861%, pada apel 1,389%, kiwi dan anggur 0,889%, stroberi 0,556%, dan jambu 0,544%. Kandungan sukrosa pada gula kelapa bongkahan yaitu sebesar