

***As harvest  
time is  
approaching.***



***Relax ...  
with the  
ART-System***

Product from environmental analytic products company



## Ripeness is an important quality criterion for storage apples



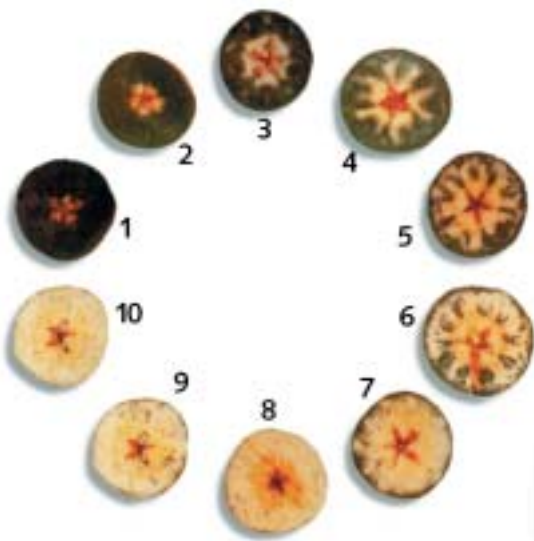
Only apples harvested at the optimum time will satisfy the highest requirements of taste, color, appearance and firmness of the fruit flesh even after months of storage. These parameters are all essential for successful sales of storage apples.

According to the method developed by Dr. Streif, Germany, starch reduction, fruit flesh firmness and sugar content are determined and used for the calculation of the 'STREIF INDEX'. Several varieties of apples have already undergone storage experiments using the Streif index to evaluate optimum harvest conditions.

The starch reduction value (starch index) is determined by coloring half an apple with potassium-iodine solution. Until now the starch index has been determined by visual comparison with a standard 10-step template. The results of this method may vary with the subjective evaluation of the person conducting the test and the surrounding light conditions.

## Determination of the degree of ripeness

The ART-system (Apple Ripening Test) analyses the coloring of the apple halves by means of digital image processing and thus determines the starch index and the diameter objectively and reproducibly. Starch index values from 1 to 10 are produced. These values, together with the measured



values for fruit flesh firmness, sugar content and color of the apple, can be combined, stored and evaluated in an efficient database. In this way the user has access at any time to information about the fruit ripening process on the farm or in the storage coolers. This system allows for comparison of harvests from year to year and over many years.

## Components of the System

### 1. Lightbox ART-LB

The lightbox is the camera- and lighting unit, and produces the measurements which determine the starch index. The apple fruit halves are placed individually under the camera. With a single keystroke the diameter and starch index can be measured reliably and reproducibly and automatically entered into the database.

B/W CCD-Camera, Frame-Grabber (requires free ISA Slot for Win98 or free PCI Slot for Win2000/NT Systeme), Lightbox made of anodized aluminum profile and easy-to-clean plastic surface panels, size 700x400x400 mm. 115/220VAC power supply, ART analysis software.



### 2. Refractometer ART-RE32

The Hand-held Digital Refractometer determines the sugar content in fruit and grape production simply and quickly. Just a few drops of juice placed on the measuring prism, a single keystroke and within 3 seconds the temperature-compensated results are shown.

Main characteristics:

Optical measuring system based on limited angle measurement

No movable parts inside

Sample chamber made of stainless steel

Measuring Range: 0-32% Brix  
(= % mas. Sacch. in liquid solution)

Resolution: 0.1% Brix.

Measuring time: 3 seconds

Measuring temperature: 5 - 40 degC

Accuracy: 0.2% Brix (at clear sugar solution)

Sample size: 0.1 ml or more

Power source: battery (AC adapter optional)

Dimensions: 170x90x40 mm

### 3. Penetrometer UP-PE 01

The Penetrometer UP-PE 01 has been developed especially for use in fruit- and vegetable growing and is designed to measure push and pull forces and determine fruitflesh firmness.

With just a single action (peeling of the measuring point is not necessary) the specially formed plunger will always penetrate the apple to the right depth. The





## Clarity and Transparency with the ART-System

### Prediction of the harvest date

The ART-Soft supplies the user with clear graphic diagrams which show the ripening process in different areas of the farm versus time, together with the optimum harvest values. By updating these graphic diagrams regularly, the optimum harvest dates for these respective areas under cultivation can be predetermined.

### Quality Control

The ART-System with its reproducible results makes continuous monitoring of fruits possible and easy to manage. For each sample a selectable certificate can be printed to show all informations. This is supplemented by documentation that consists of general parameters of the entire supply such as color distribution, skin texture etc.

**Storage Certificate**

Sample No: 34636 Date: 12.11.1998

**Supplier (Member ID):**  
Muster John (00001)  
75877 Teichhausen Am der Plage 77

**Storagecode:**  
CA\_01

**Sort:** Concord  
Stempel: Ansp. Großhaus

**Product condition:**  
Condition: sorted  
Fruit firm color: very good

**Negative Properties (in %):**

Green spots:	2	without stem:	45	spotted stems:	40	fruit injuries:	3
wash:	0	water jet:	0	bruises:	0	rot:	0
fat:	0	rough:	0	marks:	25	rotten:	0
cut:	7	chipped:	04	holes:	0	holes:	0

**Sample:**

Sample	Firmness (F) (N)	Sugar (S) (in %)	Acid (A) (in %)	Diameter (in mm)	Color (1-6)	Ripeness index +F(S-A)
1	8.6	12.9	3.9	70	7	0.110
2	8.0	12.9	3.5	70	8	0.185
3	8.7	12.9	3.7	80	8	0.140
4	9.7	13.5	3.8	76	8	0.111
5	8.9	14.7	3.5	76	4	0.134
6	7.7	12.7	3.7	80	3	0.184
7	4.9	16.4	4.5	76	5	0.086
8	5.8	14.2	4.2	76	8	0.086
9	5.9	13.5	4.8	76	7	0.085
10	4.5	15.3	4.2	70	8	0.085
Average	6.11	13.76	3.98	76.3	5.8	0.118
Required	6.5-7.0	12.5-13.5	4-5			0.100
Decision	OK	+	+			

**Decision:**  
Probably storable: long  
Suitable for CA-storage: yes  
General estimation:  
This Sample are Test-Samples

### Quality Management

Because ART-Software stores all data in the database, individual farming units or areas under cultivation can at any time be quickly analyzed regarding their quality of delivery.

## System Requirements

PC as follows :

- Pentium with 100 MHz or more
- Min. 16 MB RAM
- Min. 5 MB free hard drive capacity
- SVGA 800x600, 256 colors
- CD-ROM drive

Operating System:

Operating systems:

ART-Soft: Win95, Win98, Win2000 WinNT

Using Starchanalysis under Win95, Win98 a free ISA Slot is required.

Since 2001: Using Starchanalysis under Win2000, WinNT a free PCI Slot is required



The ART-System was developed in co-operation with Dr. Herwig Koehler, National Institute for Teaching and Test Laboratory for Fruit Growing in Oppenheim, Germany, and promoted by the Agency for Technology and Innovation, Brandenburg LTD.

Further Information available through:

[www.upgmbh.com](http://www.upgmbh.com) — [www.apfelreifetest.de](http://www.apfelreifetest.de)

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