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Banana and plantain in Africa: Harnessing international partnerships to increase research impact
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Physico-chemical changes during early fruit development and ripening of 3 *Musa* cultivars grown in Cameroon

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Bananas and plantains are very important crops in Africa and Cameroon

CARBAP has the largest *Musa* collection although most of the varieties are unknown by population

Many food uses of bananas & plantains in Cameroon and surrounding countries: boiled, fried, roasted, etc.

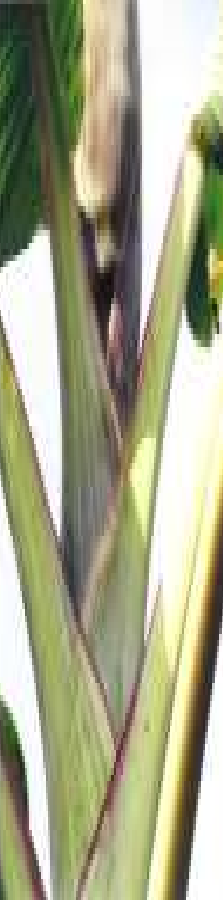
✓ Uses changes according to the ripening stage

Studies have been carried out in Africa (Nigeria, Côte d'Ivoire, Malawi, Cameroon, etc.) on physicochemical characterisation of bananas... but focusing only on ripening





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1. No information concerning fruit filling for early maturation
2. No information upon stage 7 of post harvest maturation

Aim: Investigate some physicochemical changes of 3 *Musa* species during early development and ripening

On-plant: Measure the variations of some physicochemical characteristics during fruit filling

Off-plant: Evaluate the changes of physicochemical parameters during post harvest maturation



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French sombre
locally consumed
plantain



Pelipita
cooking banana
suitable for chips



Grande Naine
dessert banana
common for export





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➤ 3 plants per cultivar identified, selected and marked immediately after flower emergence.

➤ Fruits sampling started immediately at end of shooting (all the hands of the bunch been presented)

data for early fruit maturation only concern

T0: day 0 after shooting,

T42: 42 days after shooting,

T84: 84 days after shooting.





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➤ Harvest: fully green mature stage (ripeness of one finger on the first hand of the bunch)

➤ Bunches deheaded - fruits from 2nd & 3rd hands randomly selected - stored (23°C - 26°C) for ripening follow up

➤ Ripening stages considered

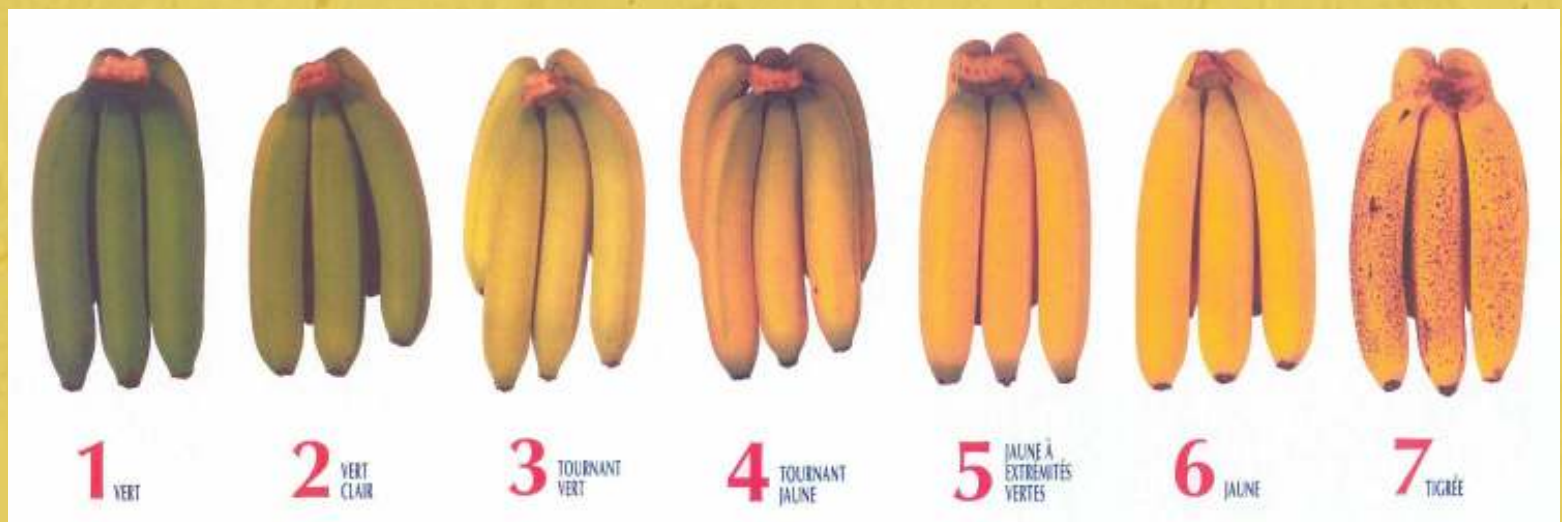
1: dark green

3: pale green with yellow tips

5: more yellow than green

7: yellow with black spots

9: more black than yellow





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At each ripening stage, the following parameters were evaluated:

1. Fruit length (tape)
2. Peel thickness & grade (pair of callipers: *Stanley* model)
3. Pulp firmness (manual penetrometer)
4. Pulp & peel weights
5. Dry matter content of pulp & peel (oven-drying 105°C, 24h)

15g pulp or peel blended in 45 ml distilled water for:

6. pH of the peel and pulp (digital pH-meter: Inolab, pH level 2)
7. Total soluble solids (REF 113 Brix 0-32 ATC refractometer)
8. Total titratable acidity (0.1N NaOH during titration)
9. Peel and pulp colours (colour charts)... only at harvest



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Table 1: Some *Musa* characteristics at shooting and harvest

	<i>French sombre</i>		<i>Pelipita</i>		<i>Grande naine</i>	
	Shooting	Harvest T90	Shooting	Harvest T162	Shooting	Harvest T89
Fruit length (cm)	13.33	21.00	10.67	17.00	9.33	16.00
Fruit grade (cm)	1.50	3.53	1.93	4.45	1.63	3.77
Peel thickness (mm)	2.17	3.00	3.33	3.00	3.17	3.00
Peel colour	Light green	Dark green	Light green	Green	Light green	Green
Pilling	Easy	Easy	Easy	Easy	Difficult	Easy
Pulp colour	Cream	Orange	Cream	Ivory	White	Cream



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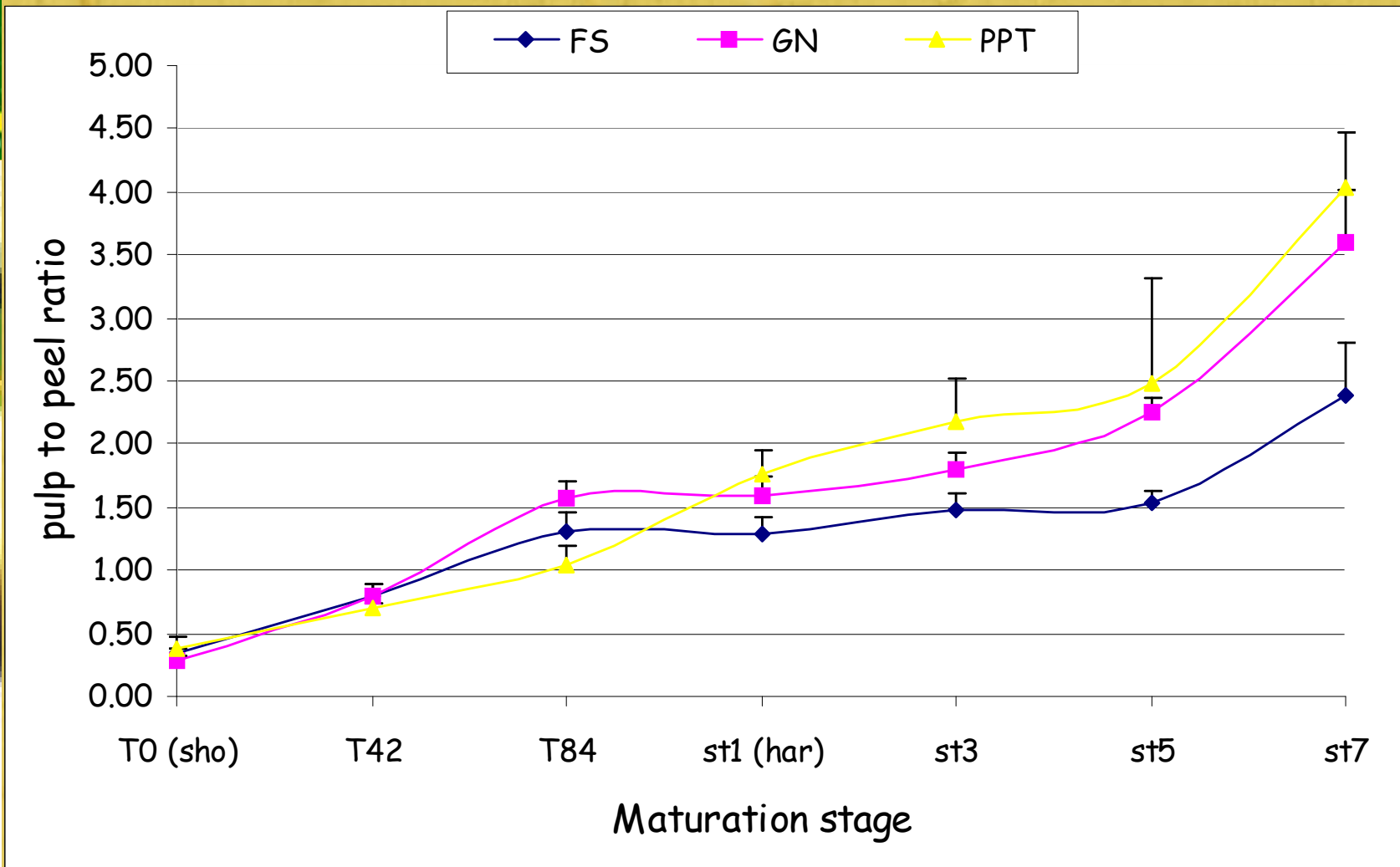


Figure 1: pulp to peel ratio variation during *Musa* early and post harvest maturation



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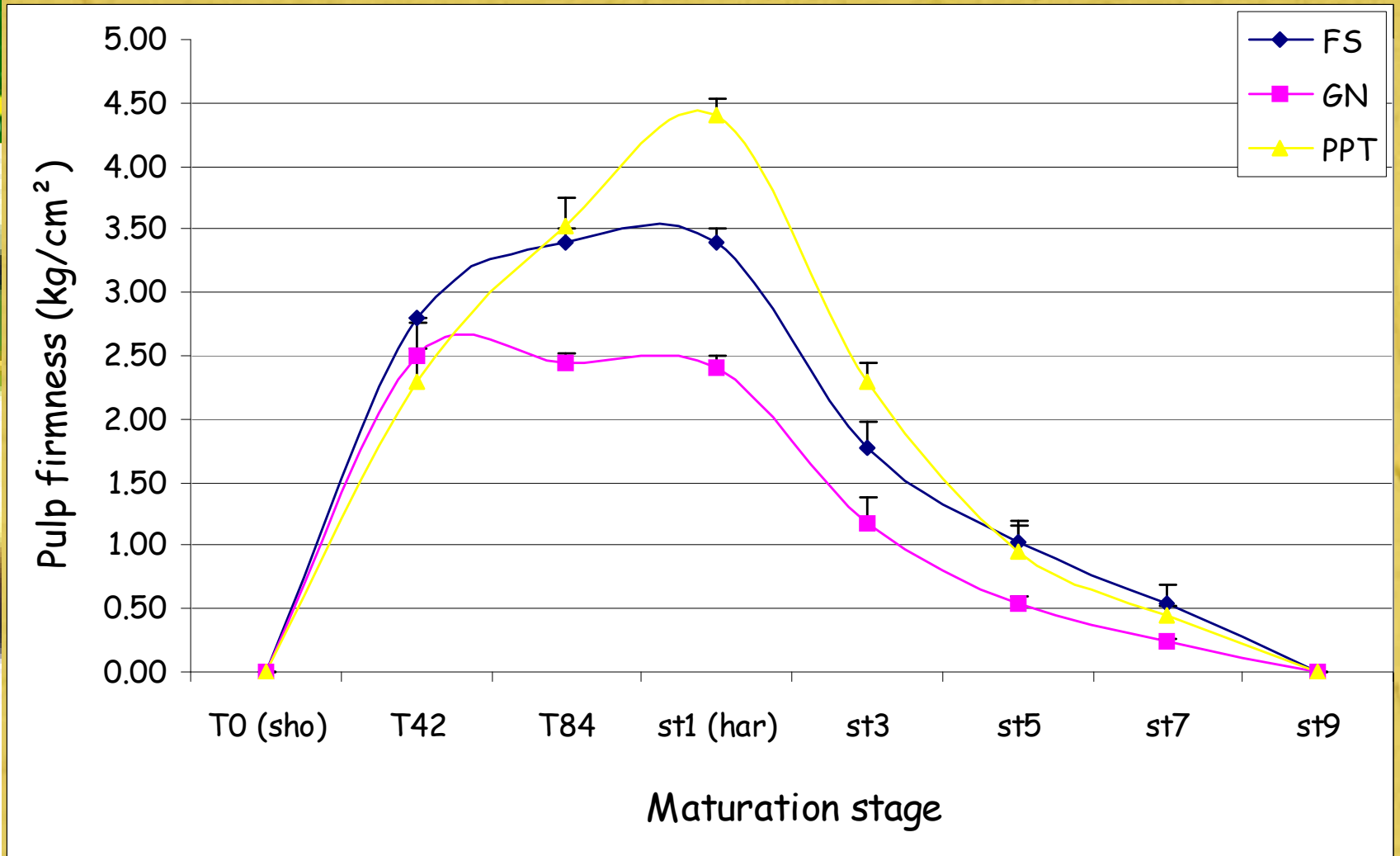
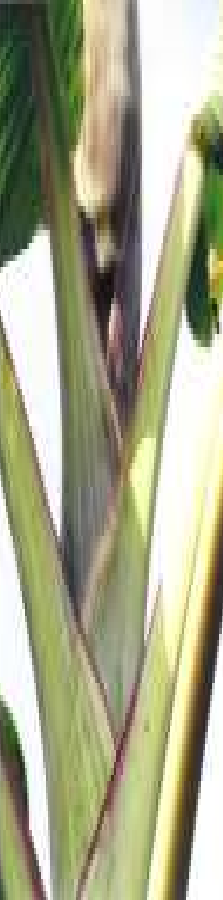


Figure 2: Changes in *Musa* pulp firmness during early and post harvest maturation



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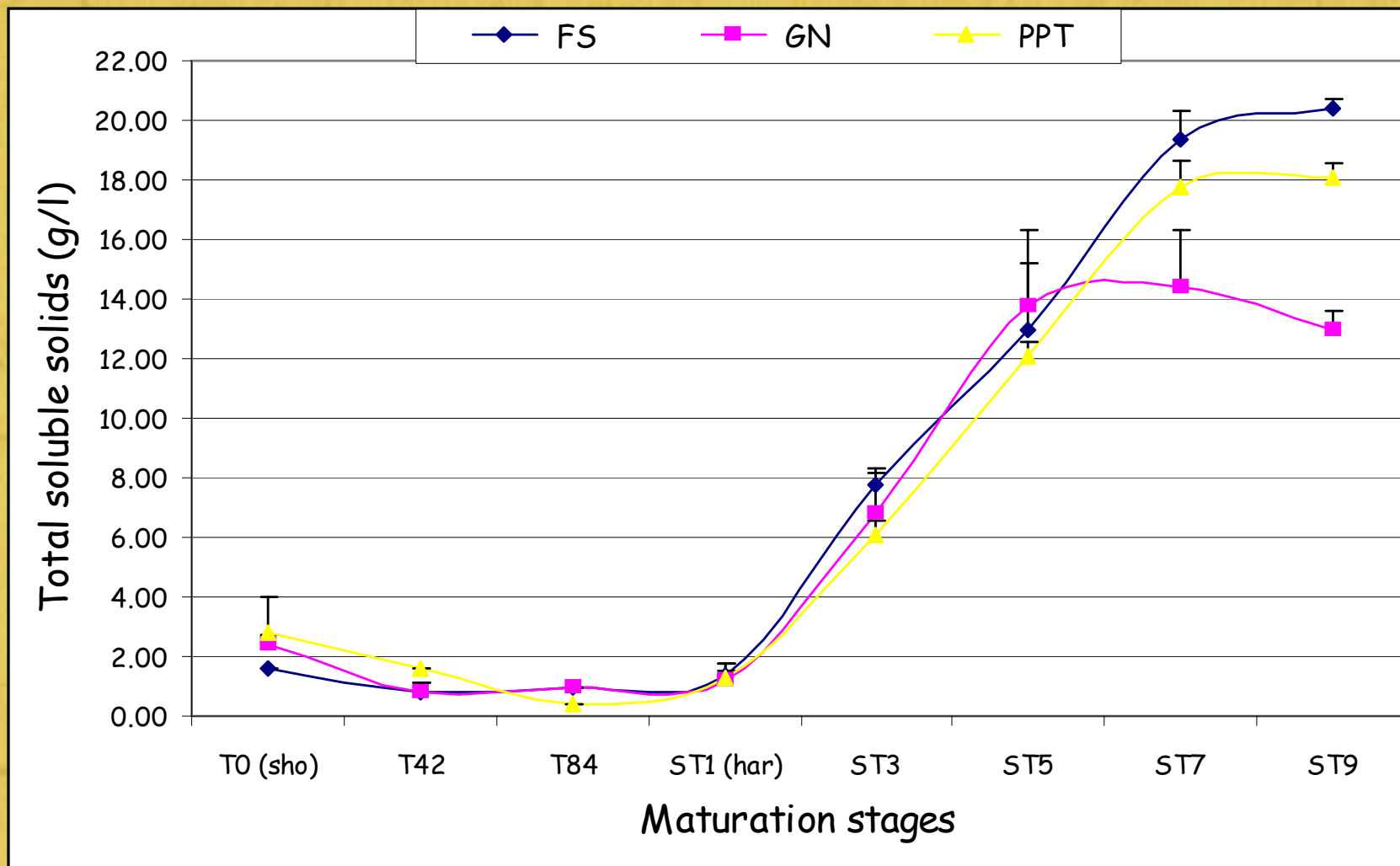


Figure 3: Changes in total soluble solids contents of *Musa* pulp during maturation



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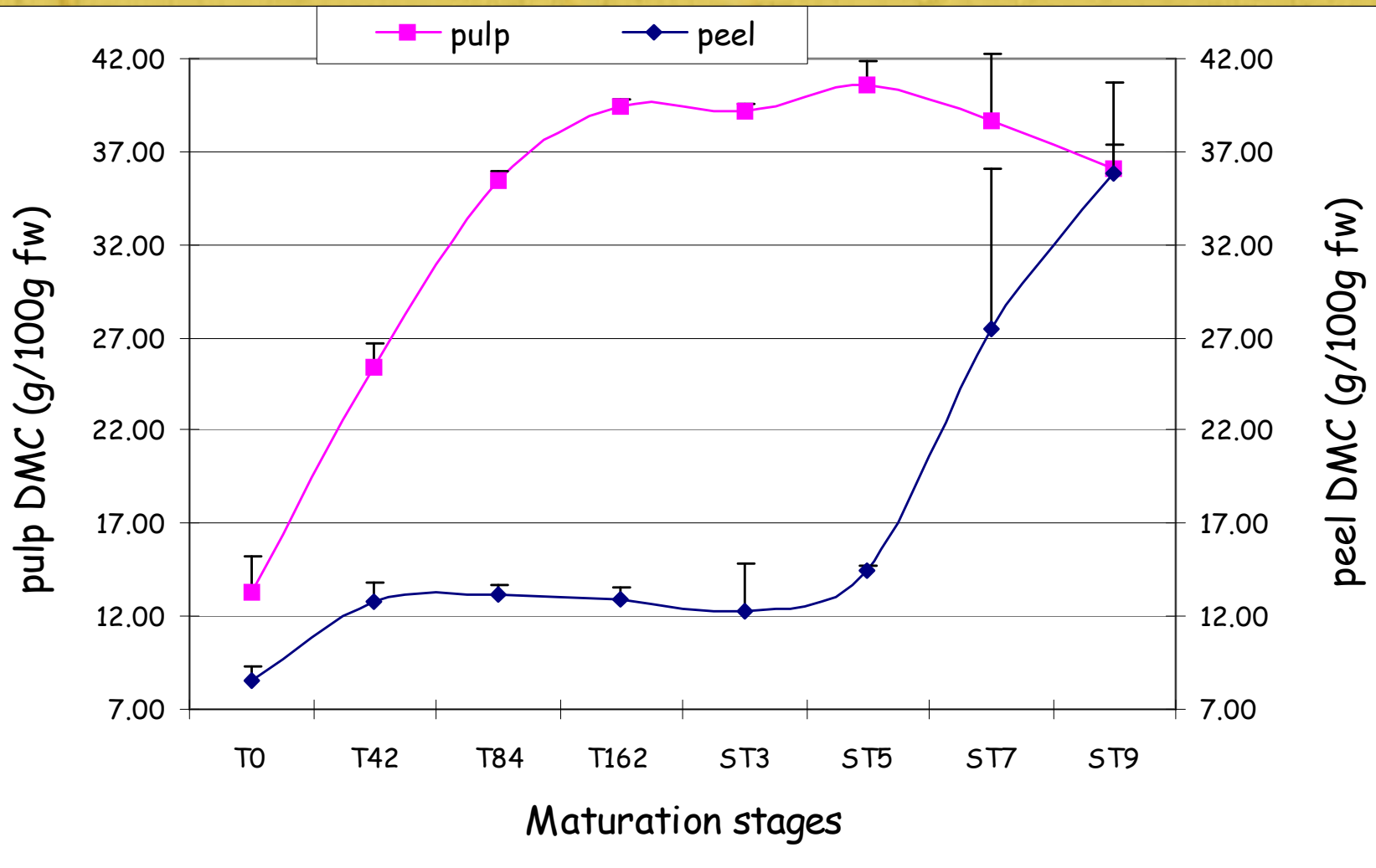


Figure 4: Changes in pulp and peel dry matter contents during maturation (*Pelipita*)



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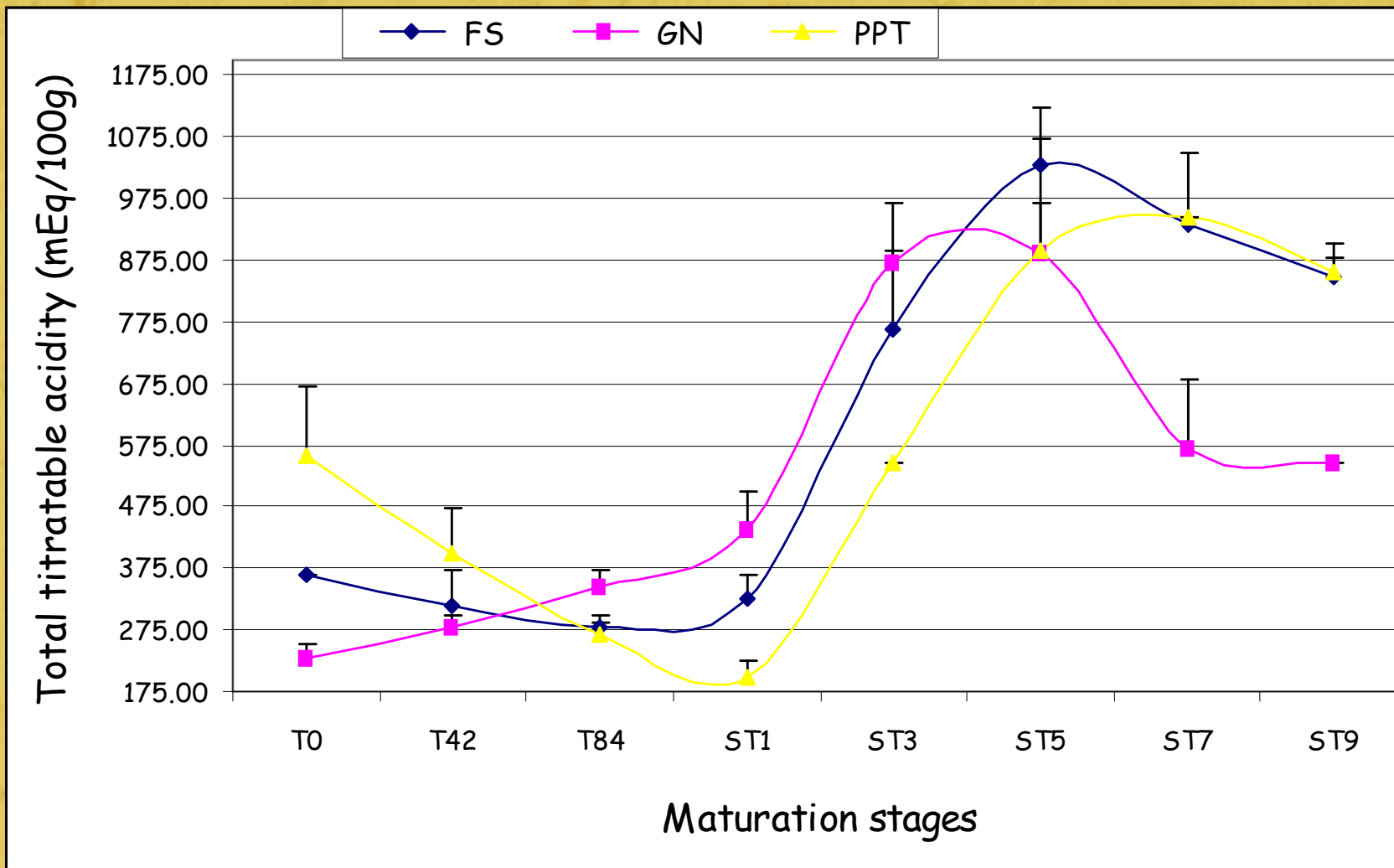


Figure 5: Evolution of total titratable acidity concentrations during *Musa* maturation



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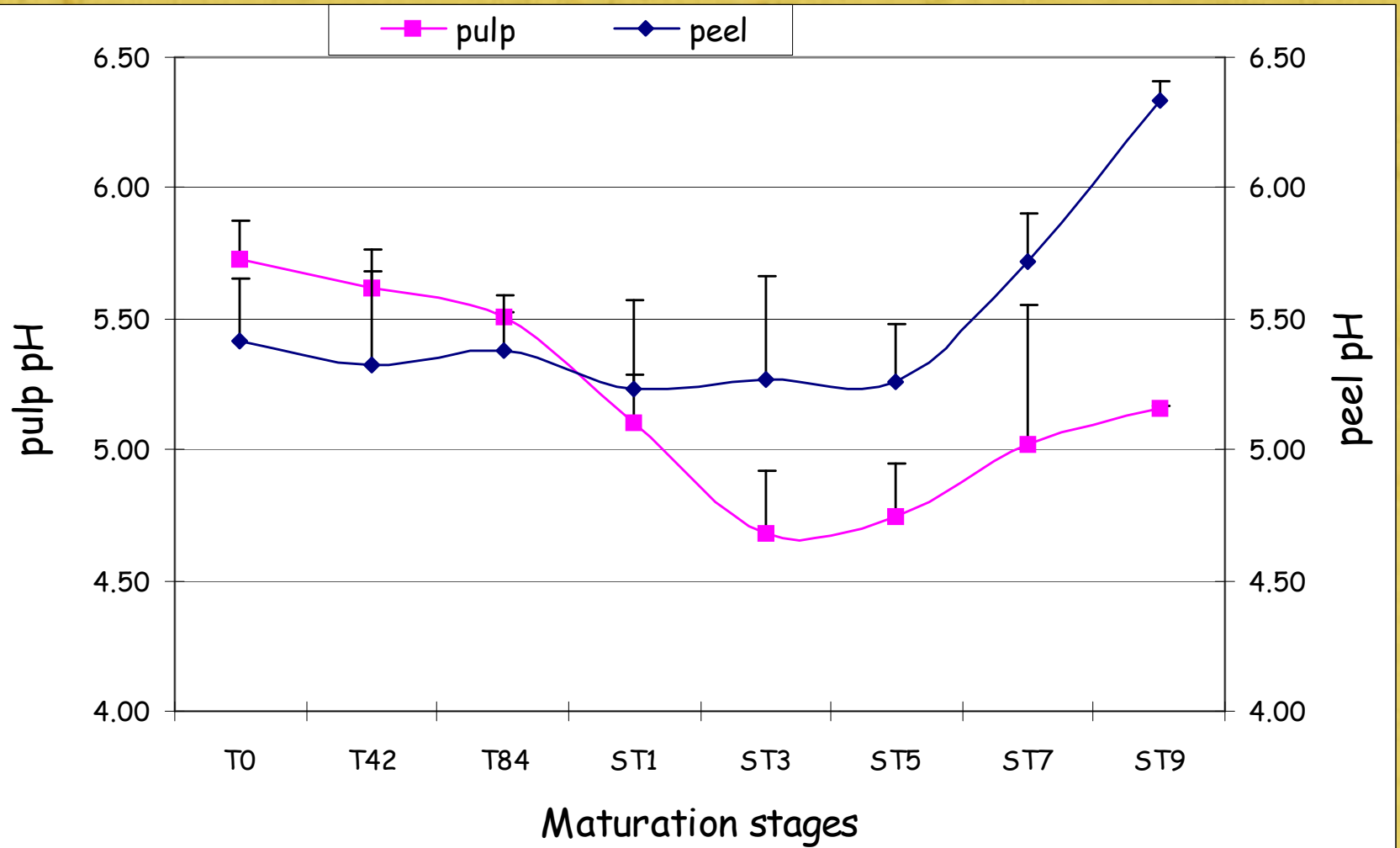
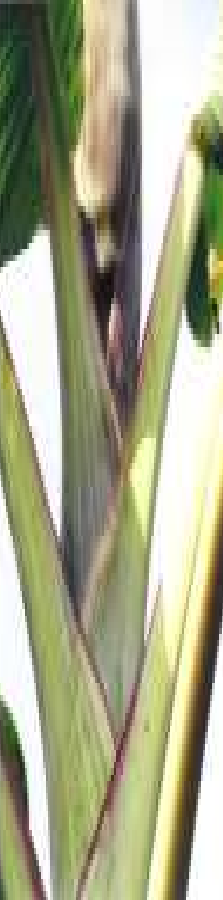


Figure 6: Changes in pH during *Musa* maturation (*Grande naine*)



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1. At shooting: relatively low values of almost all investigated parameters were observed
 2. During the fruit filling and post harvest maturation: physicochemical characteristics varied (significantly) according to *Musa* types
 3. Variation trends differed (significantly) according to cultivars
- ✓ These data will help *Musa* breeders and *Musa* processing units
 - ✓ They will be reported into the *Musa Germplasm Information System of Bioversity International*.
 - ✓ Further studies including nutritional aspects, processing, sensorial and microbial analysis are been carried out ...



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Trinaries