

Cigar Technology Innovation Center of China Tobacco

Effects of aging with characteristic media on the sensory quality, chemical composition and microbial community of cigar

Presenter: Hu Wanrong — CNTC Sichuan

Outline

01

Background

02

Results and discussion

03

Conclusions



THE CIGAR

01 Background

Background



aging with media, such as Spanish cedar



quality improvement of cigar

Aging—occurs after rolling
—further reduce the irritation
—improve the aftertaste of cigar

- Other new media?
- Why can aging media improve cigar quality?



THE CIGAR

02 Results and discussion

Experimental design

Step 1——Search for effective media

six of new media for the aging of cigar

- ✓ coffee formula
- ✓ cocoa formula
- ✓ rose formula
- ✓ liquor formula I
- ✓ liquor formula II
- ✓ red wine formula



Sensory quality was adopted as an evaluation index to screen effective media.

Step 2——The reason of improved quality of cigar with media

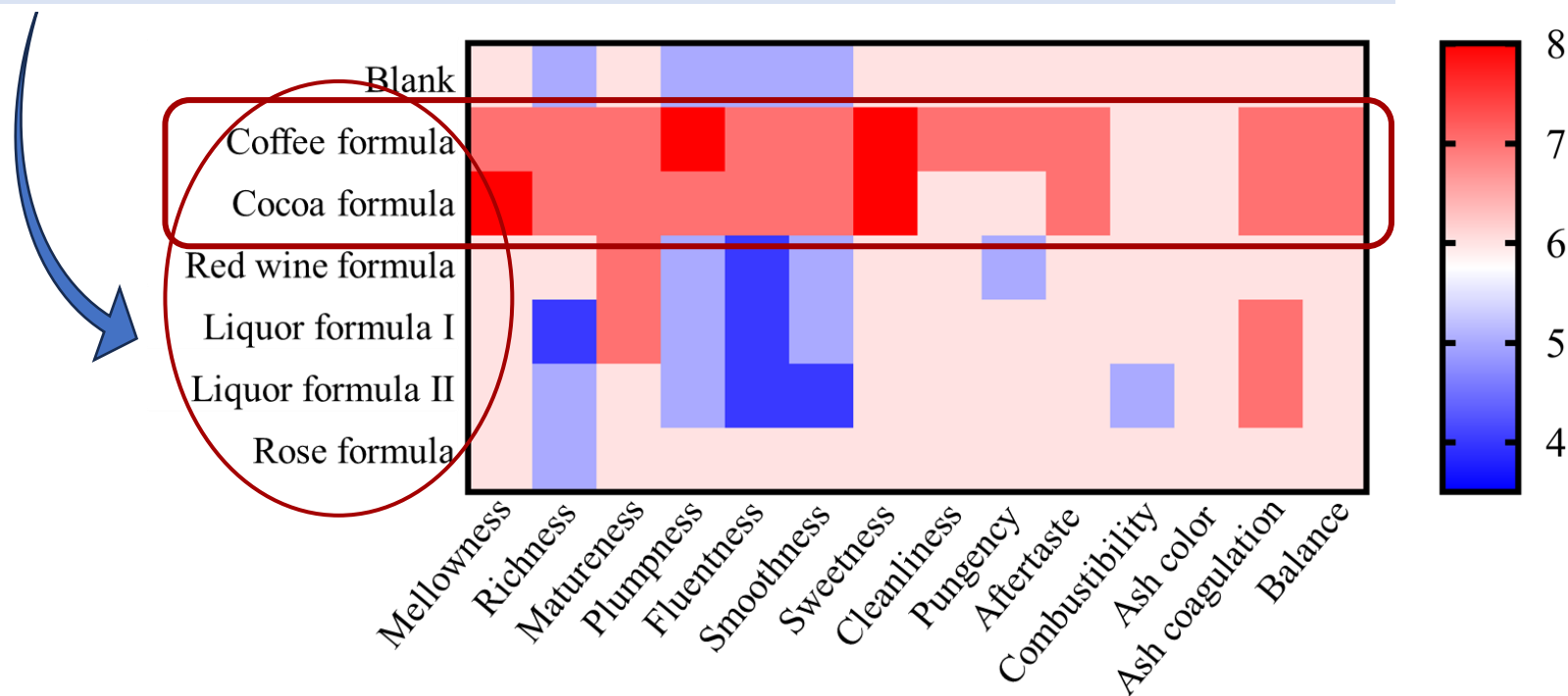
The effects of media and aging time on **sensory quality, main chemical composition and microbial community** of cigar were studied.

Sample names	Aging process
W-30	Aging for 30 d in blank-group
C-30	Aging with coffee formula for 30 d
C30-W30	Aging with coffee formula for 30 d, then aging for 30 d in blank-group
C-60	Aging with coffee formula for 60 d
C60-W30	Aging with coffee formula for 60 d, then aging for 30 d in blank-group
C-90	Aging with coffee formula for 90 d
K-30	Aging with cocoa formula for 30 d
K30-W30	Aging with cocoa formula for 30 d, then aging for 30 d in blank-group
K-60	Aging with cocoa formula for 60 d
K60-W30	Aging with cocoa formula for 60 d, then aging for 30 d in blank-group
K90	Aging with cocoa formula for 90 d



Sensory evaluation

six new characteristic media for the aging of cigar



Coffee formula

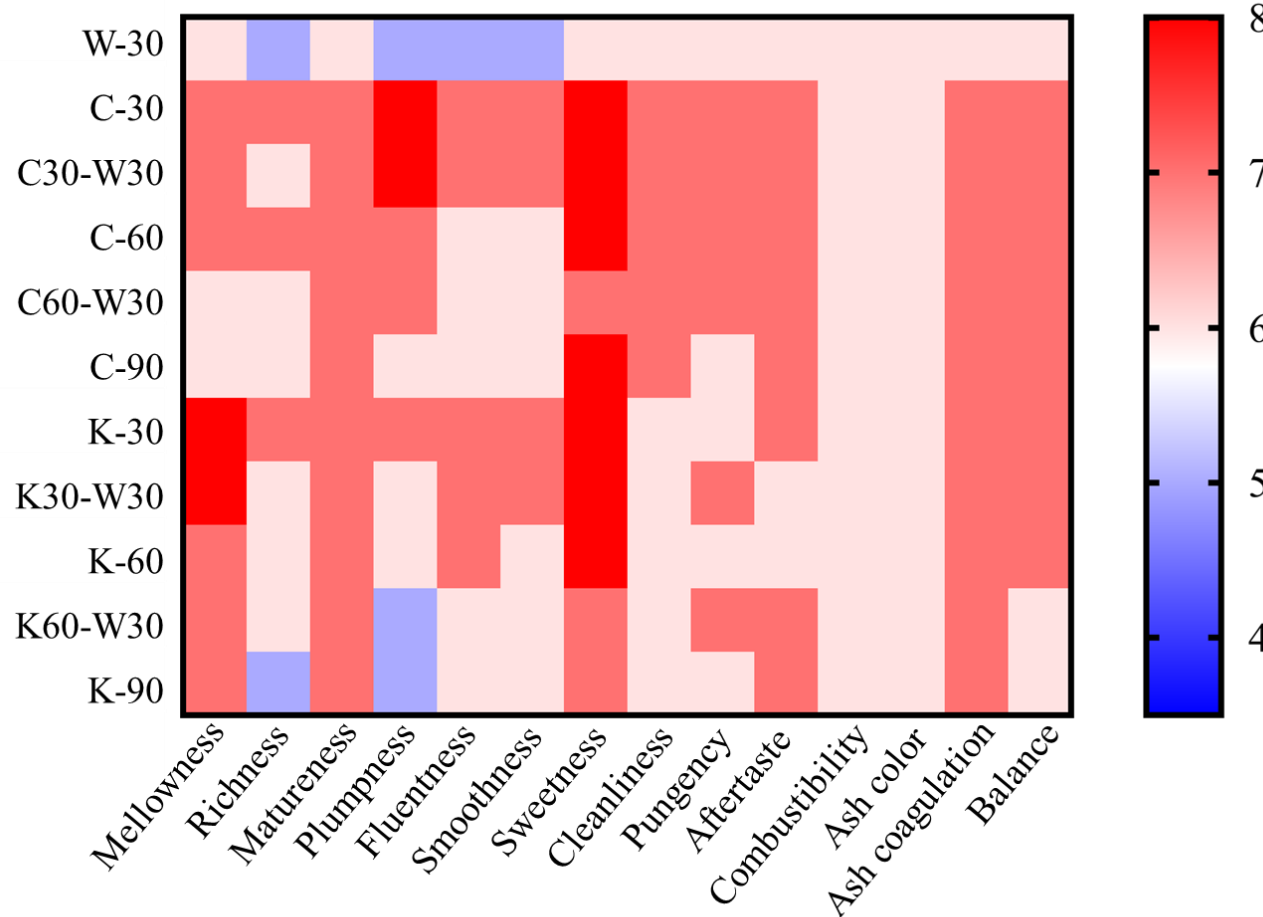
The plumpness and concentration of the smoke as well as the aftertaste were significantly improved. Nutty, caramel, and baked flavor were enriched.

Cocoa formula

The mellowness and sweetness were improved, and the permeability of the smoke was upgraded. Besides, a relatively fragrant flavor was found.



Sensory evaluation



- ❑ The decrease of sensory quality was found as the aging time increased.
- ❑ Appropriate aging period was 30 days.

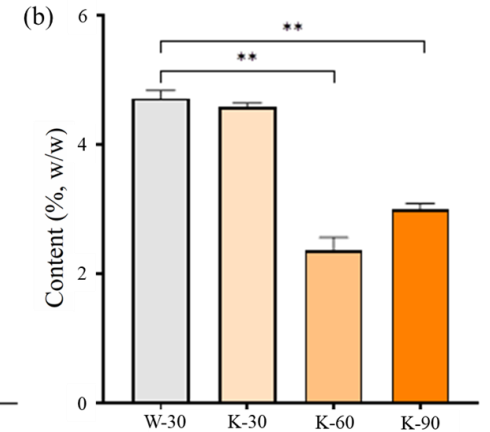
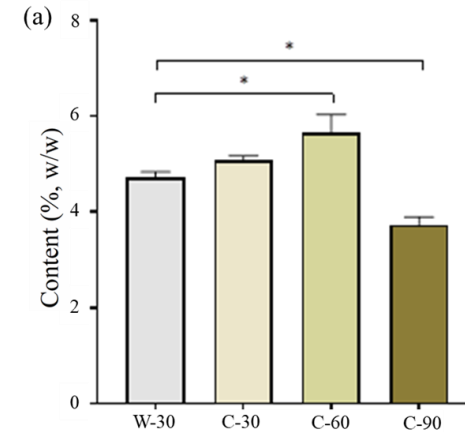
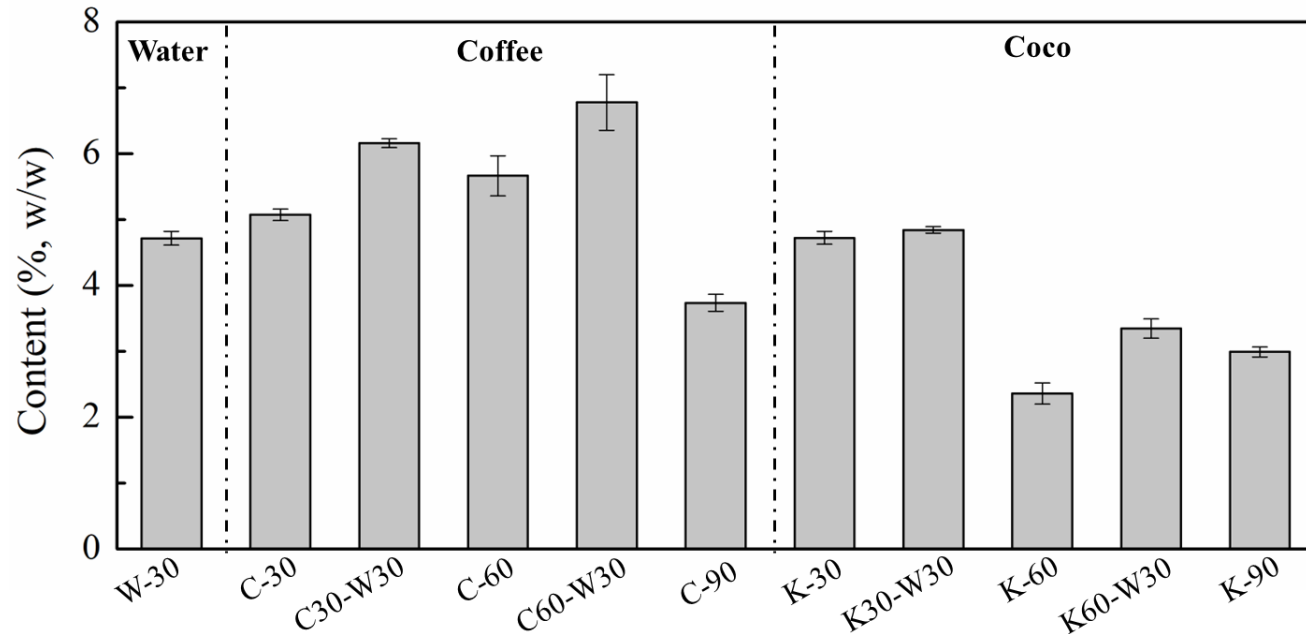
Particularly ↓

- ❑ Placing cigars in a conventional environment for 30 d after aged with media has little effect on the sensory quality of cigars.



Chemical composition

— Starch

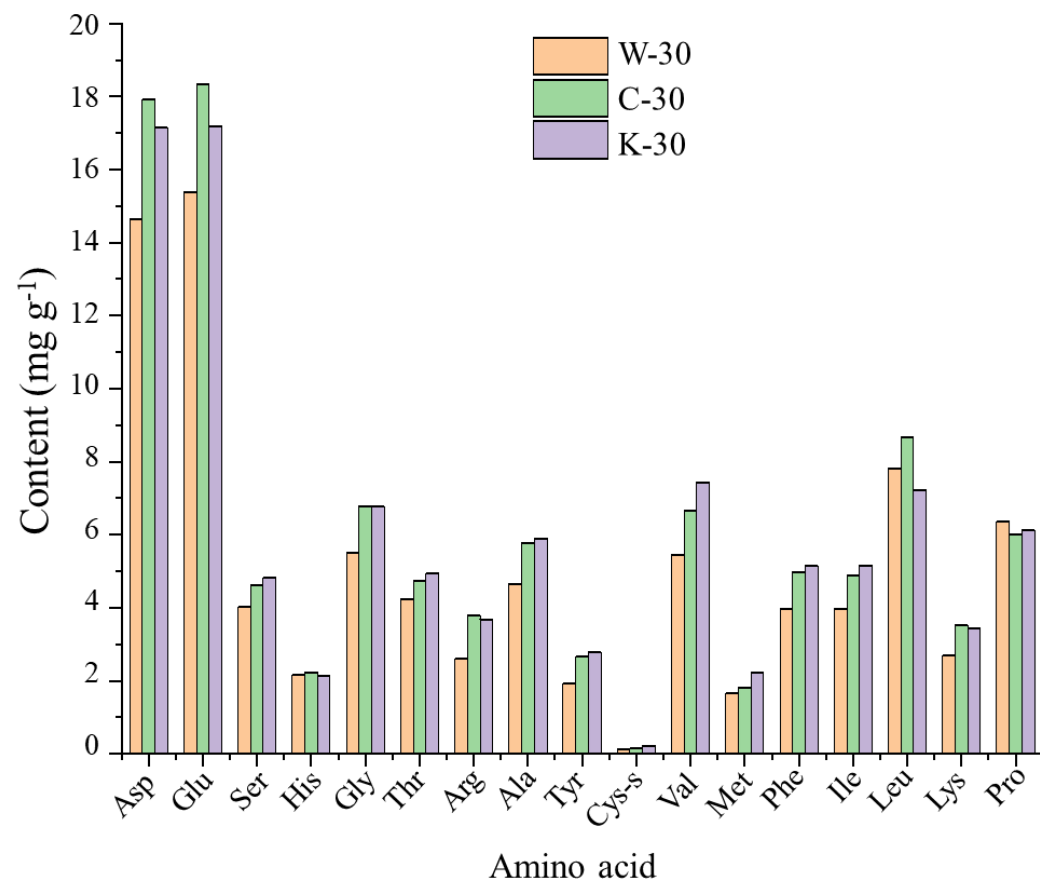


- ❑ Cigars aged with coffee formula had a relatively higher content of starch, which were all above 5%, except for C-90.
- ❑ Cocoa group exhibited lower content of starch than coffee group.
- ❑ A declining trend of starch content in cigar was detected with the extension of aging time.



Chemical composition

— Amino acid



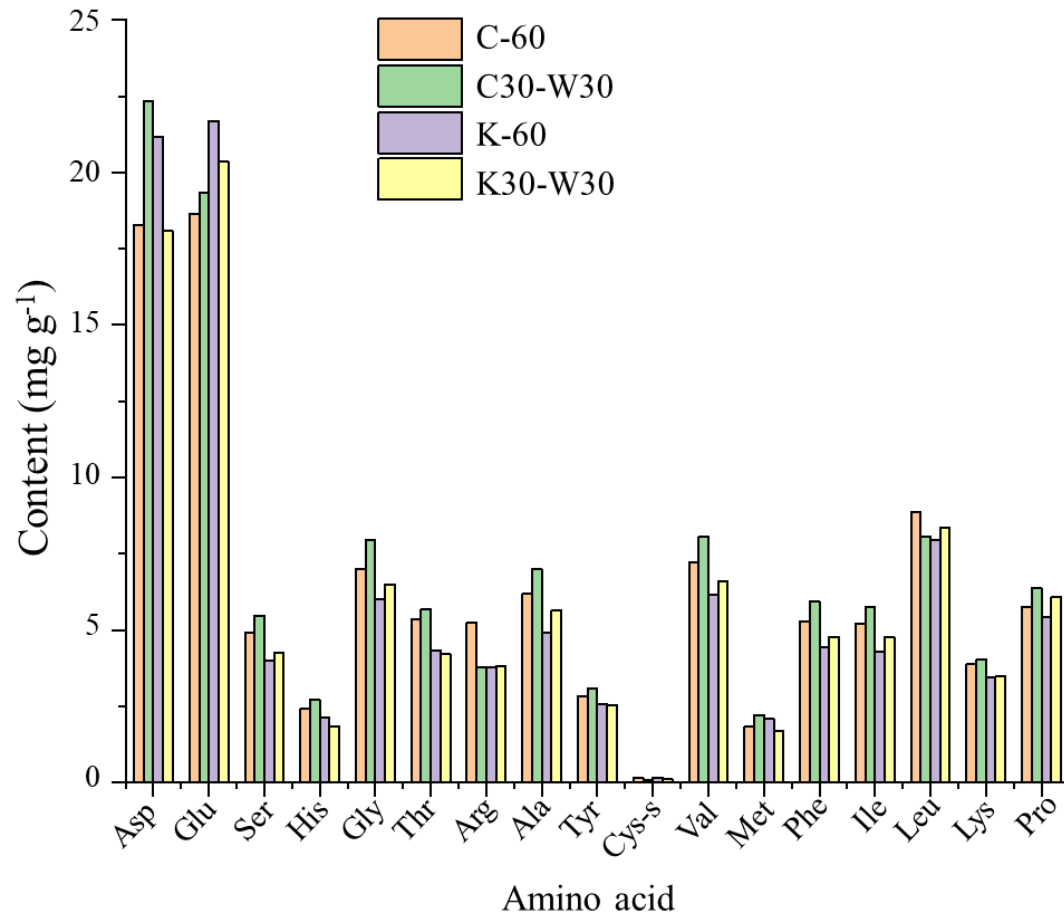
Aging for 30 days

- Aging with media could significantly increase the amino acid content of cigar.
- **Asp** content increased by 22.40% (C-30) and 17.14% (K-30), and the **Glu** content increased by 19.32% (C-30) and 11.84% (K-30), respectively.



Chemical composition

— Amino acid



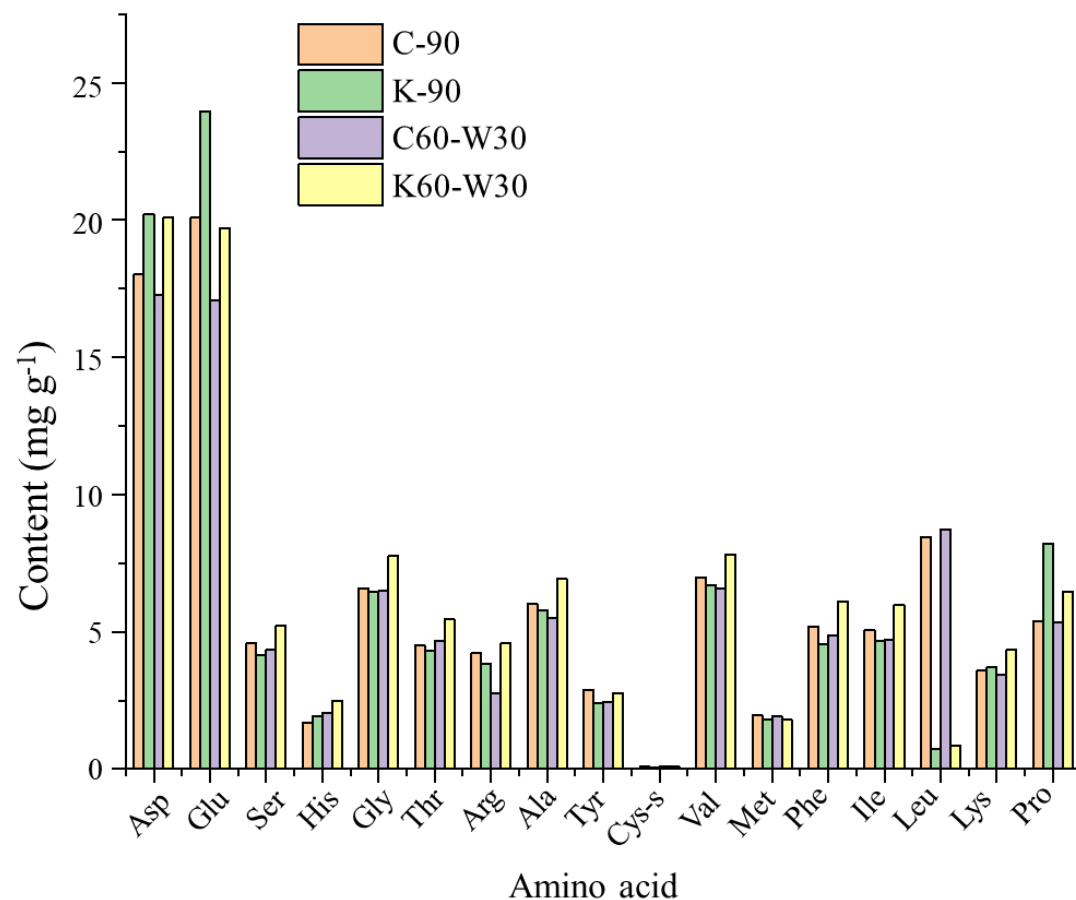
Aging for 60 days

- C30-W30 had higher content of amino acid than C-60.
- There was no significant difference in amino acid content between K30-W30 and K-60.



Chemical composition

Amino acid



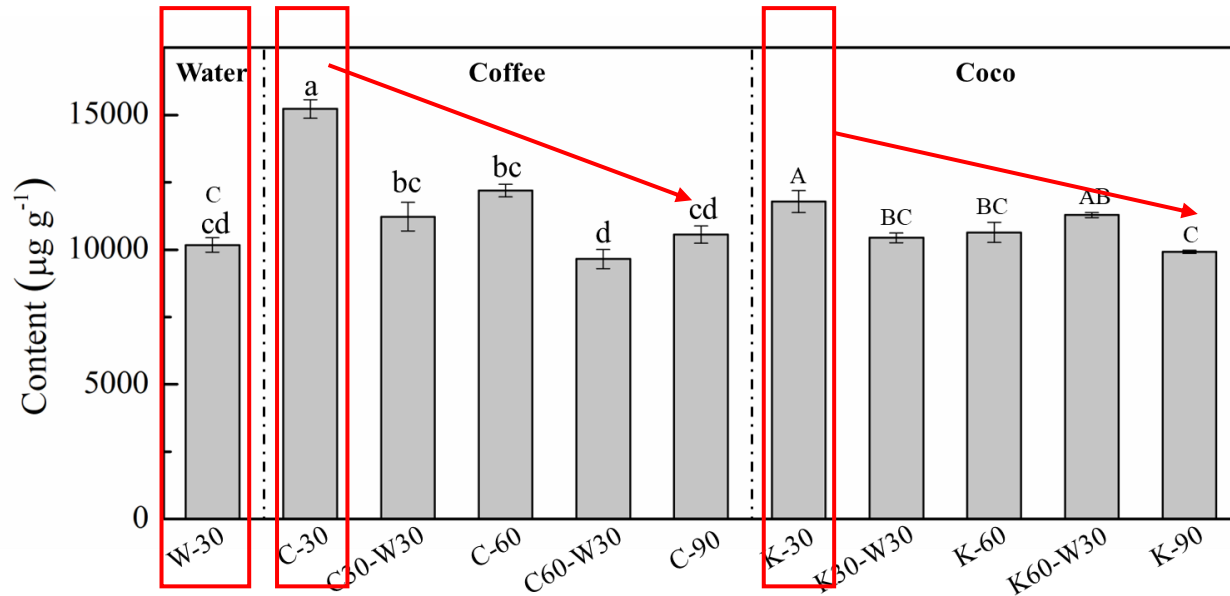
Aging for 90 days

- Aging in traditional environment after removal from the media environment showed an insignificant effect on the amino acid content of cigar.

Sample	total AA content	Sample	total AA content
C-60	108.99	C30-W30	117.76
C-90	105.36	C60-W30	98.37
K-60	104.48	K30-W30	103.05
K-90	103.48	K60-W30	108.48

Chemical composition

— Organic acid

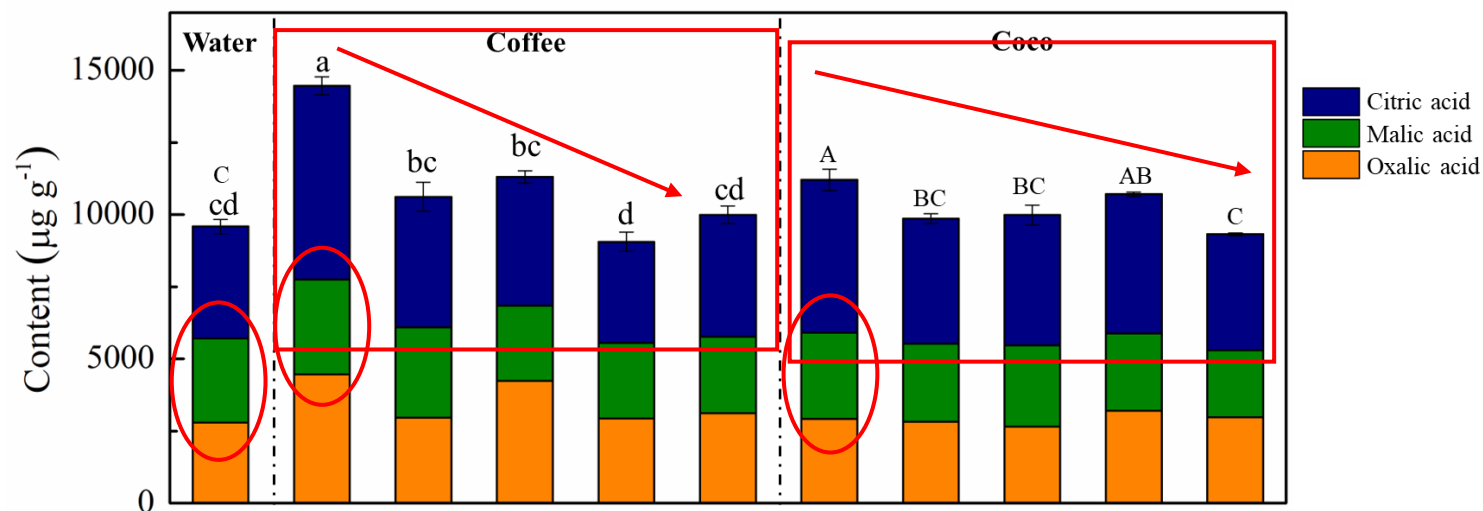


- The content of organic acid of C-30 and K-30 was obviously higher than that of W-30—indicating that coffee and cocoa introduced rich non-volatile organic acids into cigar.
- With the extension of aging time, the content of organic acid in the coffee and cocoa groups decreased.



Chemical composition

— Organic acid



□ The content of malic acid in coffee or cocoa group was higher than that in blank aging group after aging for 30 d.

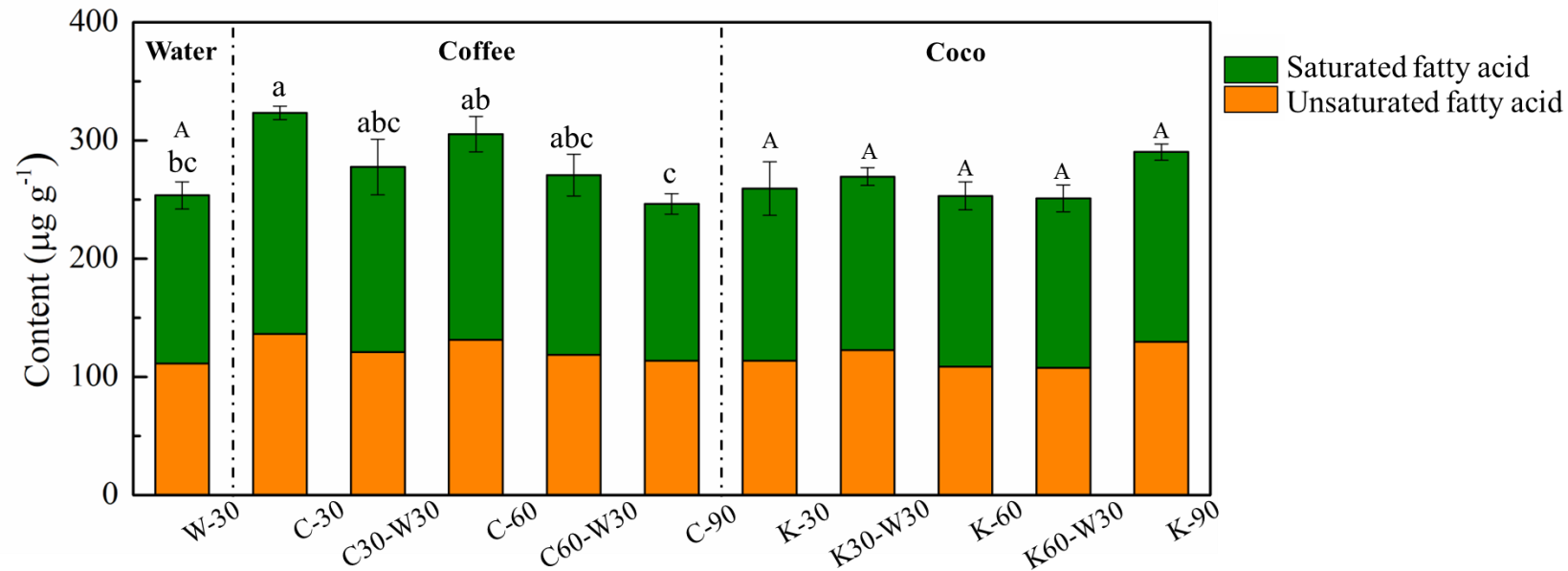
□ Citric acid, malic acid and oxalic acid are the main non-volatile organic acids in cigars, which account for more than 95% of organic acids.

□ The content of citric acid showed a decreasing trend as aging with coffee or cocoa with aging proceed.



Chemical composition

— Organic acid

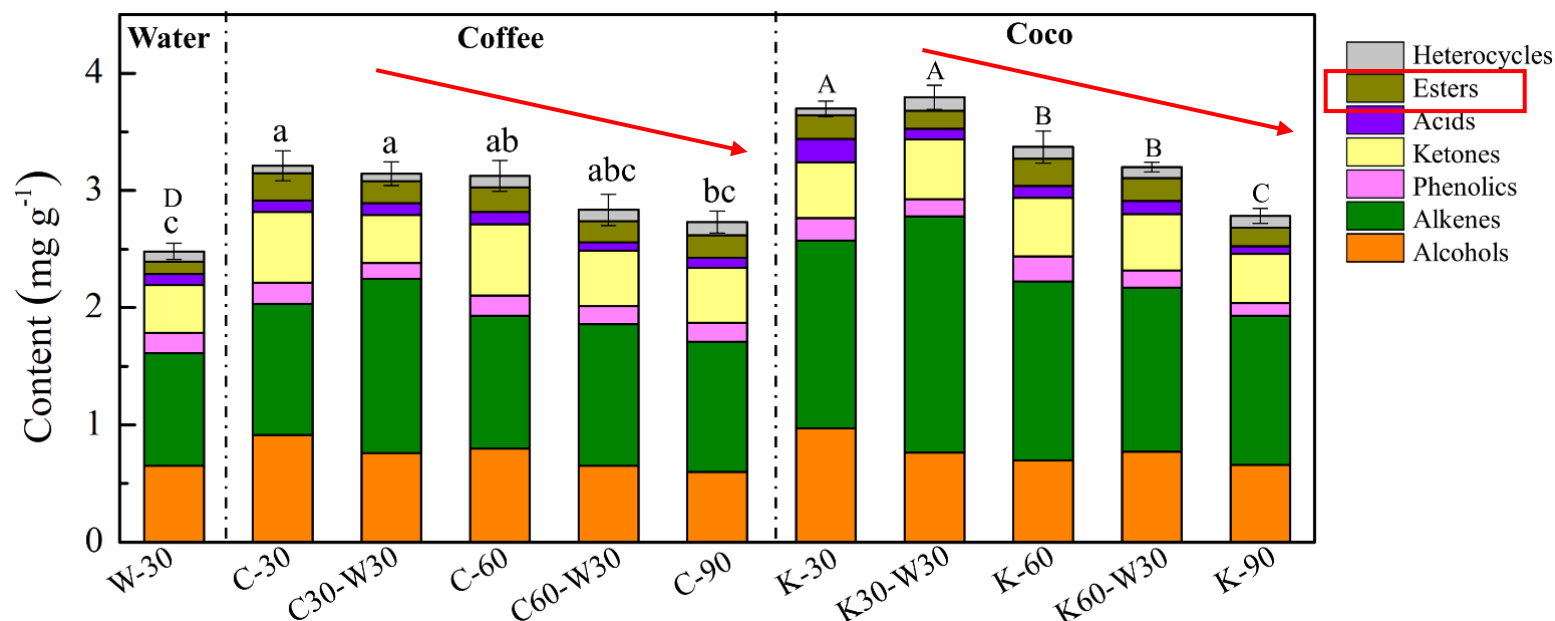


- Saturated fatty acids: mellowness and aroma richness
- Excessive unsaturated fatty acids: irritation and roughness
- Coffee group: increased saturated fatty acids



Chemical composition

— Aroma component



- ❑ Aging with coffee or cocoa significantly increased the content of aroma.
- ❑ The content of aroma components in coffee and cocoa group showed a decreasing as aging proceeded.
- ❑ The increasement of ester compounds (126.27% and 96.81%)



Microbial community

— Alpha diversity

Richness and diversity of microbial communities of cigars

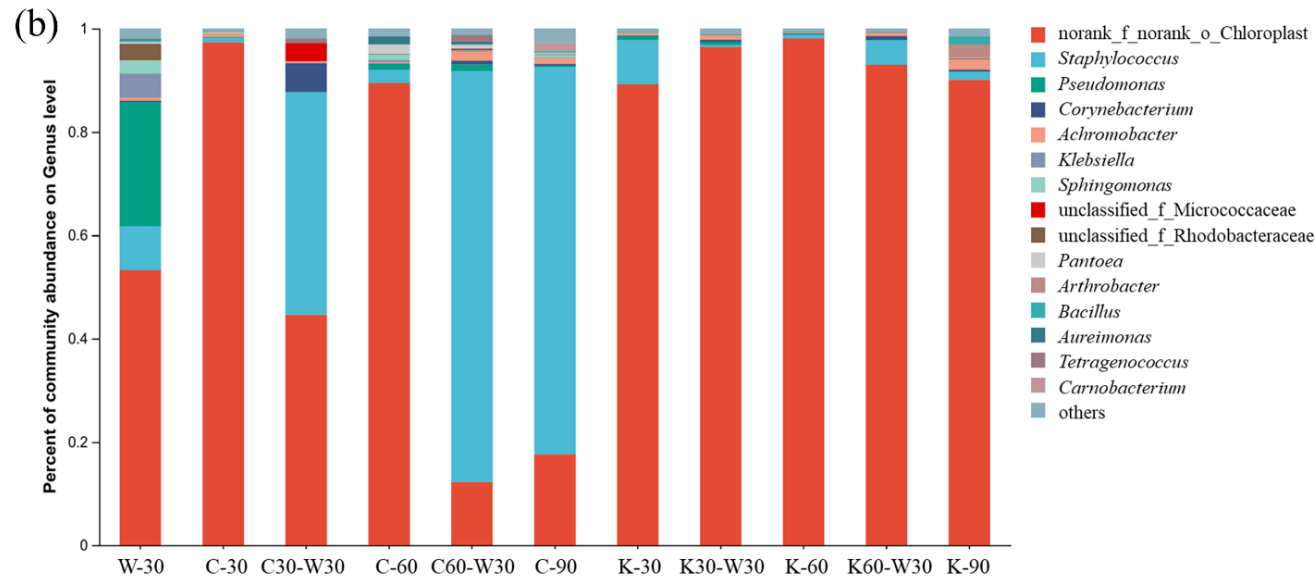
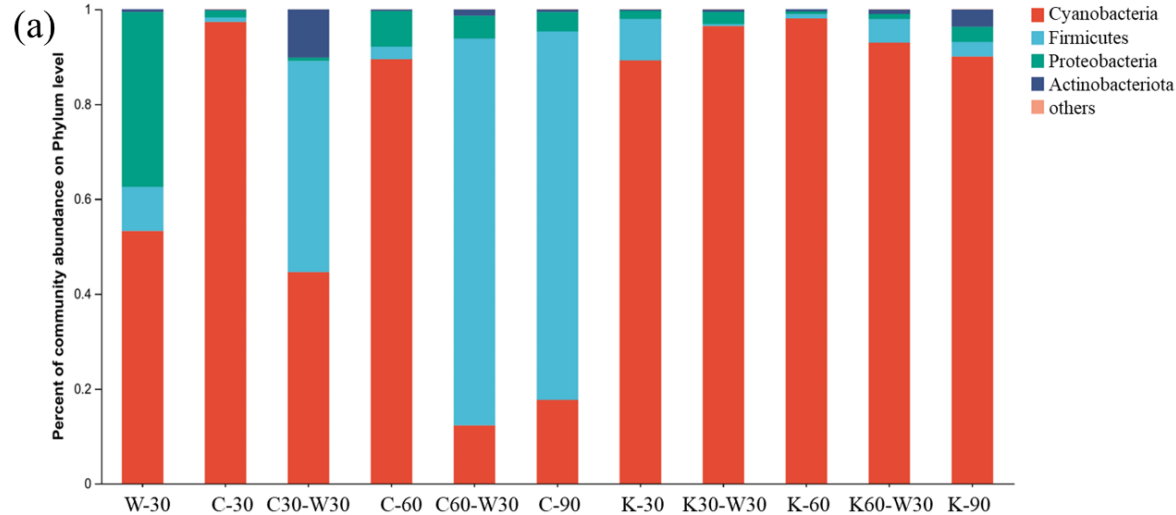
Samples	Shannon index		Simpson index		Ace index		Chao index		Coverage (%)	
	Bacteria	Fungi	Bacteria	Fungi	Bacteria	Fungi	Bacteria	Fungi	Bacteria	Fungi
W-30	1.68	2.16	0.32	0.22	103.42	70.61	100.58	70.33	99.99	99.99
C-30	0.24	2.26	0.93	0.16	84.45	91.99	82.65	91.38	99.98	99.99
C30-W30	1.29	1.52	0.38	0.32	120.46	53.00	115.25	53.00	99.98	99.99
C-60	0.68	2.10	0.79	0.29	121.85	165.08	122.00	164.67	99.98	99.99
C60-W30	0.90	2.10	0.65	0.25	132.57	89.70	128.96	89.14	99.98	99.99
C-90	0.93	1.52	0.59	0.41	126.09	57.27	125.06	57.00	99.98	99.99
K-30	0.50	2.01	0.79	0.20	115.43	58.92	126.67	58.00	99.97	99.99
K30-W30	0.28	1.73	0.92	0.27	55.94	54.26	56.60	54.00	99.99	99.99
K-60	0.22	2.07	0.94	0.20	139.69	50.20	82.14	50.00	99.97	99.99
K60-W30	0.39	0.86	0.86	0.63	72.64	20.00	72.33	20.00	99.98	99.99
K-90	0.65	1.86	0.79	0.25	91.06	53.89	90.50	53.33	99.99	99.99

- Aging with coffee medium could improve the diversity of fungi and bacteria on the cigar surface, while aging with cocoa had no significant effect on the diversity of fungi and bacteria on cigar surface.



Microbial community

Community succession: bacteria

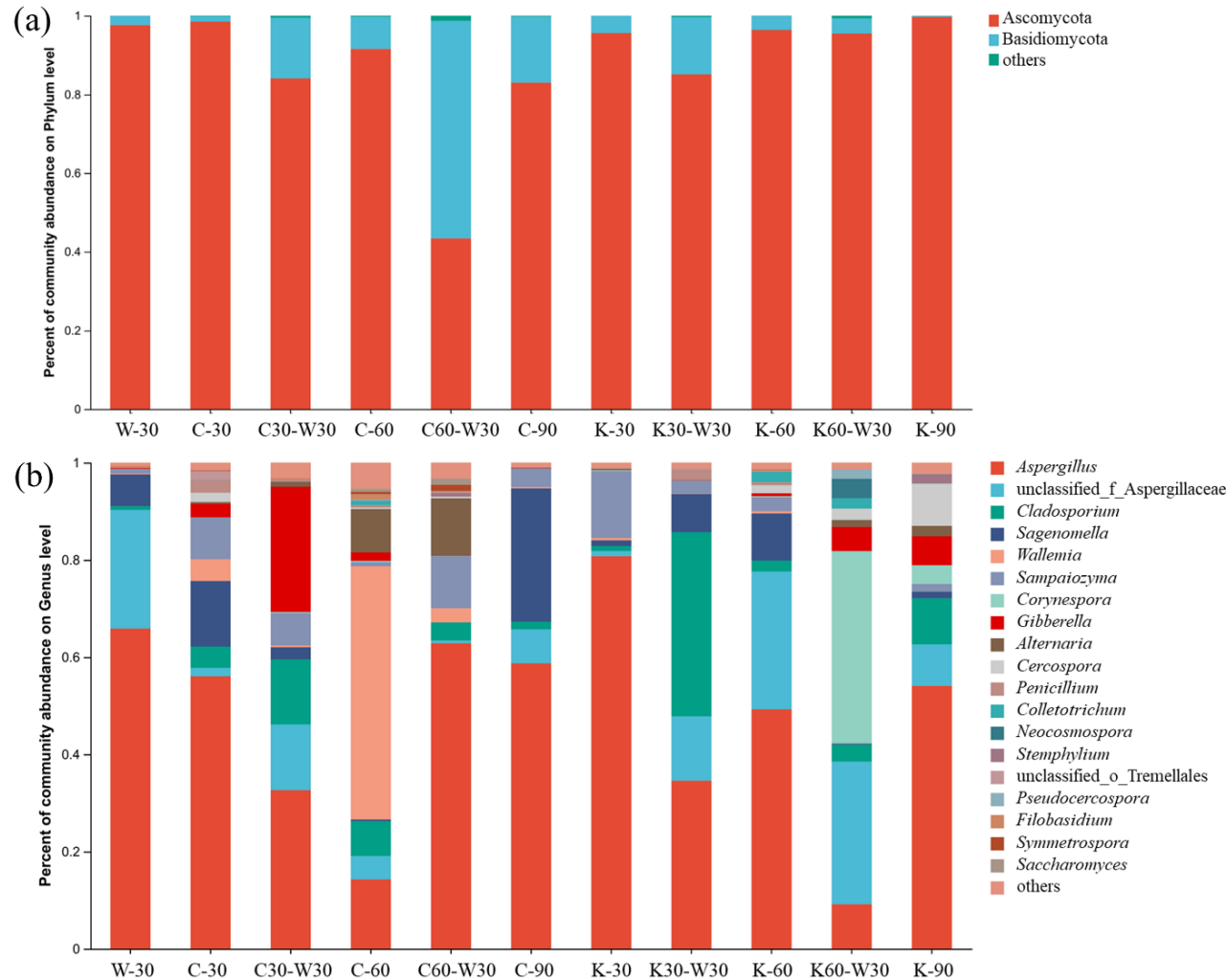


- ☐ Coffee medium: enrichment of *Staphylococcus*
- ☐ Significant effects on the bacterial community of cigar
- ☐ Aging with coffee could accelerate the succession of bacterial community



Microbial community

Community succession: fungi



□ The addition of coffee and cocoa medium has no significant effect on the fungal community structure of cigar at the genus level at the initial aging stage.

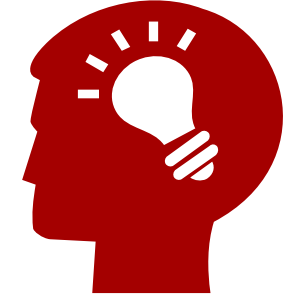
□ *Aspergillus* was the dominant fungi.



THE CIGAR

03 Conclusions

/// Conclusion



- 1. Two effective aging media: coffee formula and cocoa formula.**
 - 2. Starch content: a decreasing trend.**
 - 3. Amino acids, non-volatile organic acids and aroma components: increased.**
 - 4. Coffee formula increased the diversity of the fungal and bacterial community on cigar surface, and changed the structure of bacterial community.**
- **In this study, the influence of aging media on cigar quality was analyzed multidimensionally, which provided a reference for the development of new aging media and the technology of enhancing cigar quality.**

Cigar Technology Innovation Center of China Tobacco

Thank you for your attention!

Presenter: Hu Wanrong — CNTC Sichuan