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THIRD AFRICA CONGRESS ON CONSERVATION AGRICULTURE

5-8 June 2023 | Rabat, Morocco

Effect of different stubble management options on agro-physiological performances of durum wheat for better crop-livestock integration under conservation agriculture system in Semi- arid region of Tunisia

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Theme:
Building a Resilient Future in Africa
through Conservation Agriculture and Sustainable Mechanization

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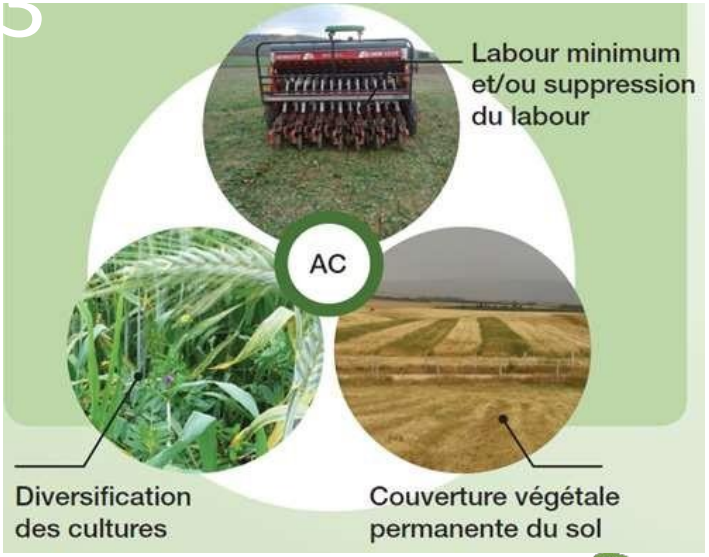
Introduction

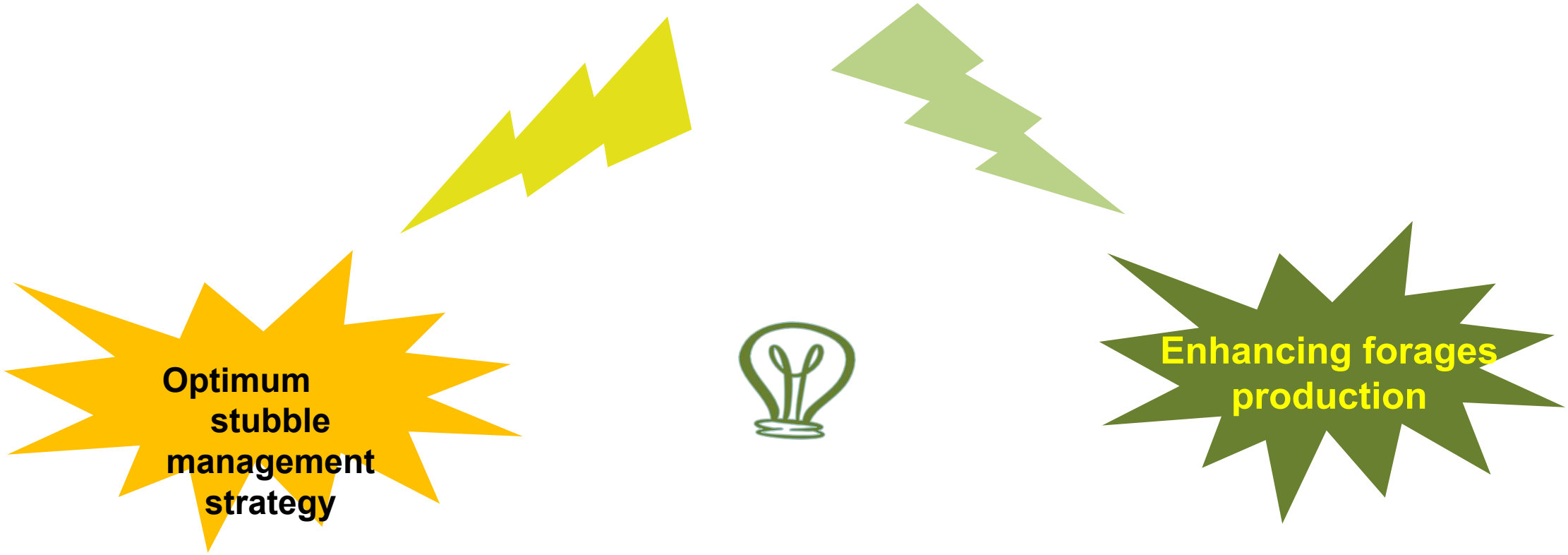
- Most of the areas under CA in Tunisia are located in semi-arid regions under rainfed conditions.
- Production systems are mainly based on field crops, especially cereals production (wheat, barley, and oat) combined with ruminant livestock **(crop-livestock integration system)**
- Stubble grazing by livestock, especially during the summer period is a traditional and common practice in the region.

Under the CA system retaining crop residue in the soil surface allows creating a conflict of interest between mulch for covering soil surface and stubble grazing, especially during the summer period



Conflict of interest between the use of stubble for livestock feeding and soil cover with residues must be resolved, particularly in drylands where fodder production is low (Trade-off is needed)

Options to solve the competition for residues between livestock (stubble grazing) and covering the soil surface (mulching) for CA principles adoption



object of the research study

ConServeTerra - Overcoming the physical and mental barriers for upscaling Conservation Agriculture in the Mediterranean

Partners

Société l'Ouest Marocain (West Maroc)

El Baraka farmers association

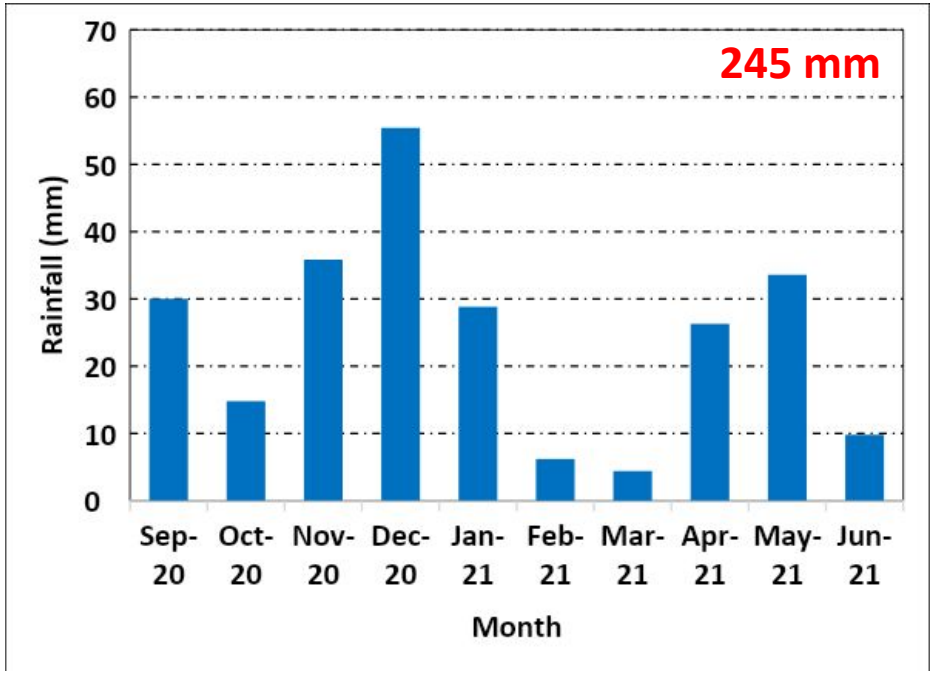
Experimental design

Treatments under NT:

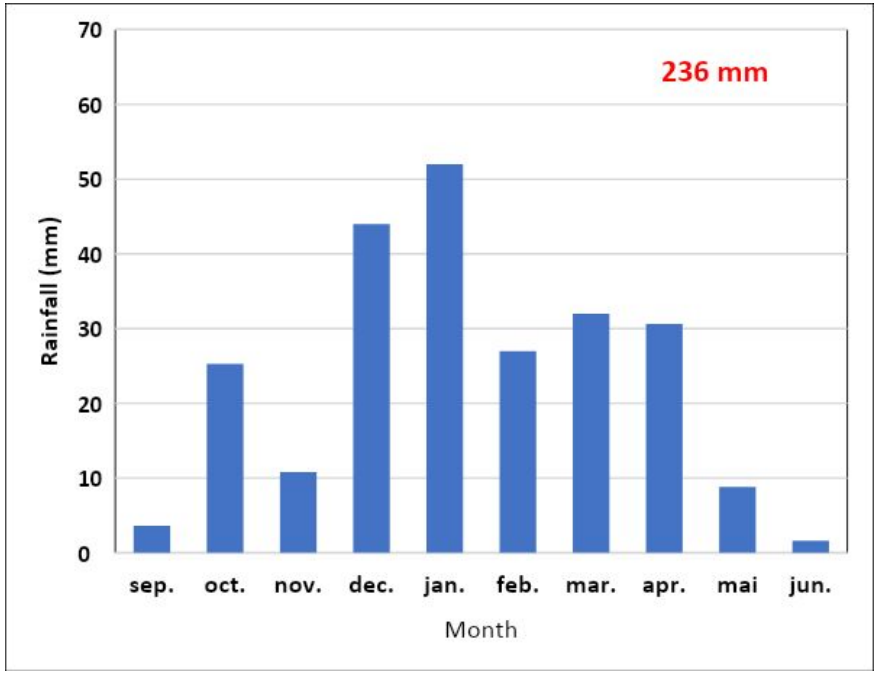
- T1: 100 % of residue keeping in the soil surface;
- T2: 50 % of residue keeping in the soil surface;
- T3: 0 % of residue keeping in the soil surface;
- T4: 50 % of residue keeping in the soil surface and burnt

Monthly distribution of rainfall at the experimental site

Mean annual rainfall: 425 mm

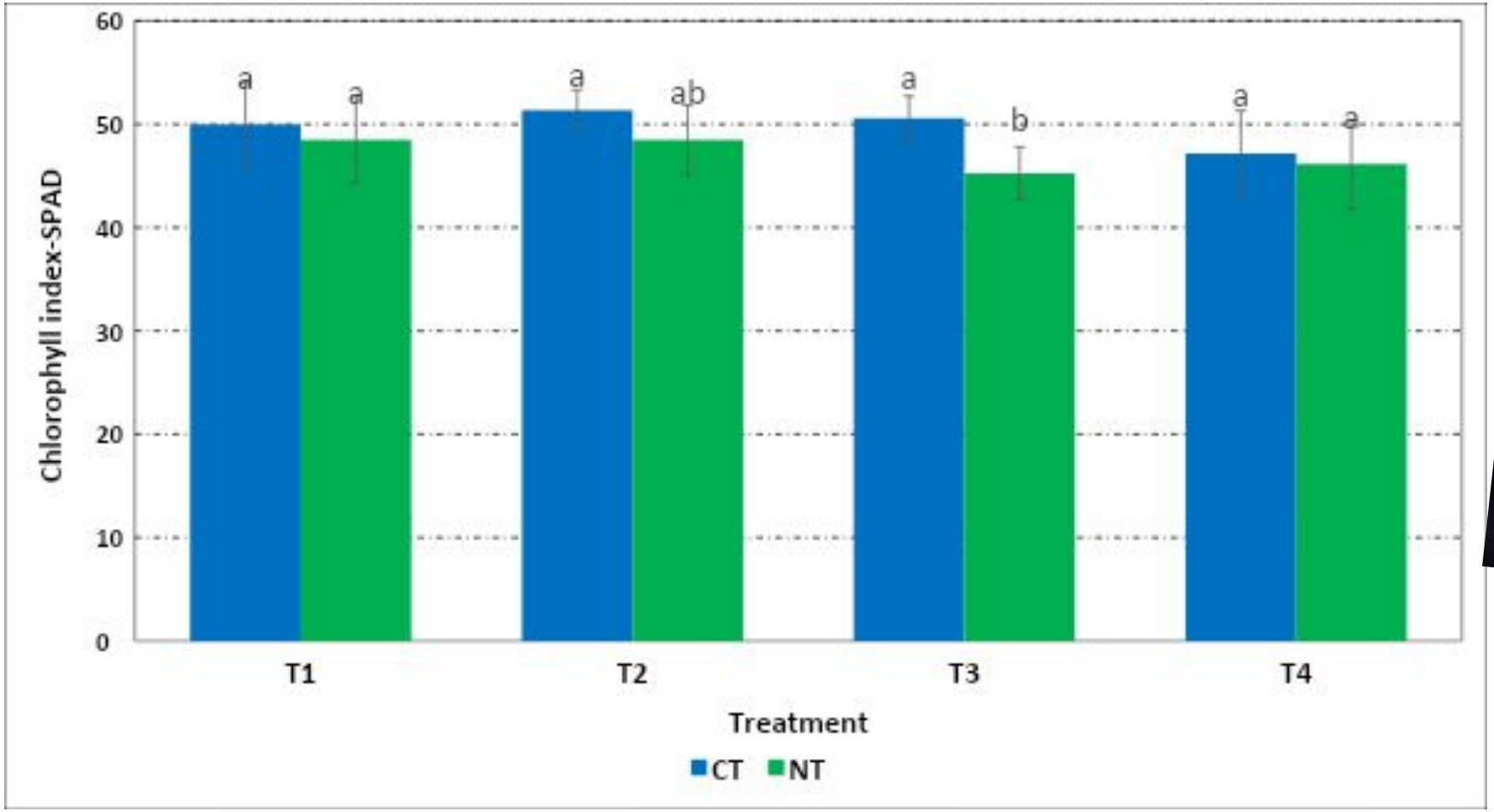


Cropping season 2020-2021

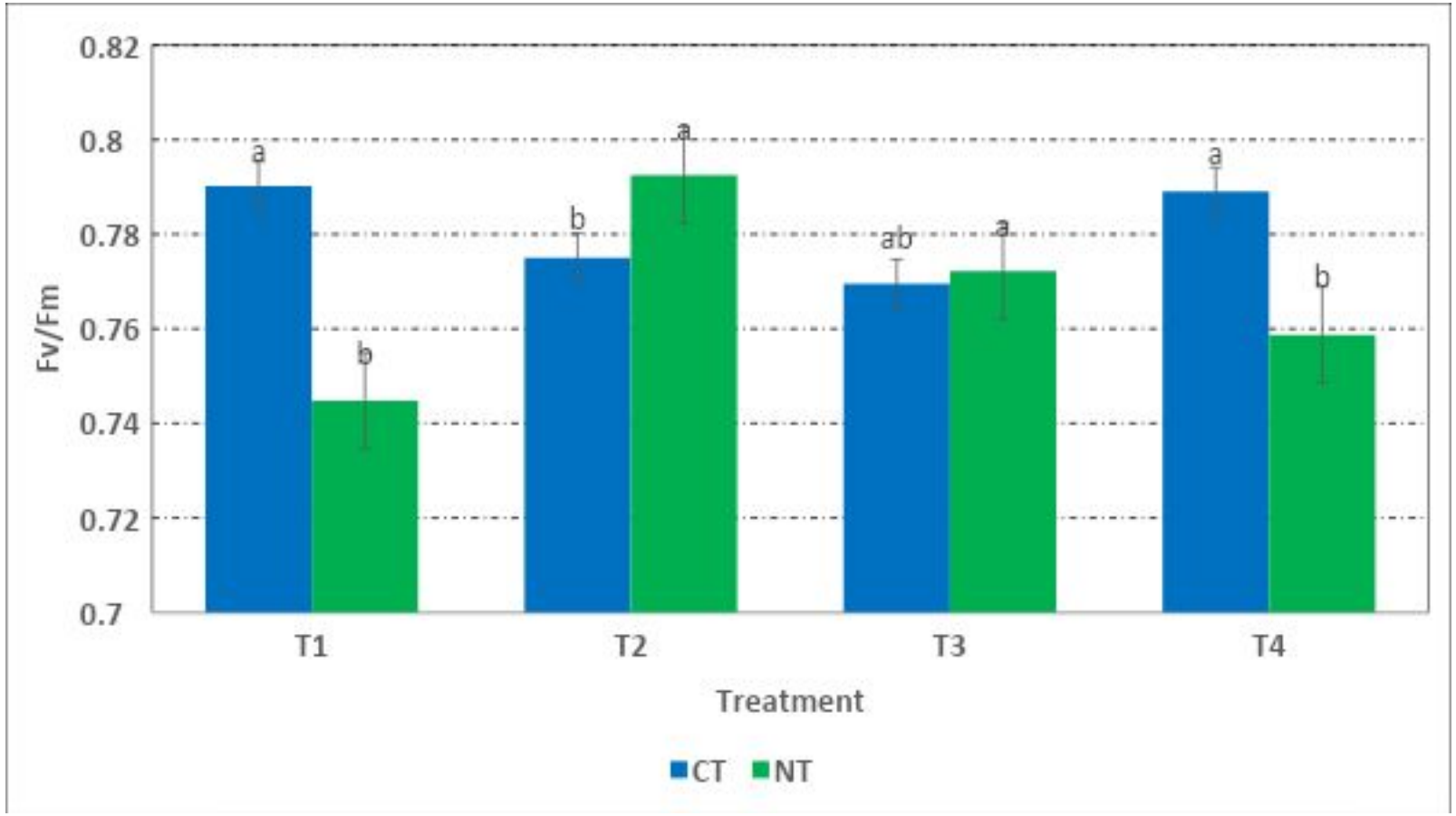


Cropping season 2021-2022

Chlorophyll index at flowering stage



Chlorophyll fluorescence performances at flowering stage



Yied components of durum wheat

NT system						
	Parameters					
Treatment	Aboveground biomass (t/ha)	Weight of straw (t/ha)	Weight of spikes (t/ha)	Number of Spikes/m²	Grain yield (qx/ha)	1000-grain weight (g)
T1	5.32a	2.42a	2.77a	202a	17.92a	44.90ab
T2	4.63a	2.09a	2.39a	195a	15.38a	42.67b
T3	4.80a	2.02a	2.66a	191a	17.77a	44.03b
T4	5.14a	2.31a	2.79a	171a	16.60a	47.99a
Pr>F	0.483	0.602	0.510	0.483	3.612	3.59
LSD	1.001	0.480	0.359	42.31	0.443	0.037

CT system						
	Parameters					
Treatment	Aboveground biomass (t/ha)	Weight of straw (t/ha)	Weight of spikes (t/ha)	Number of Spikes/m²	Grain yield (qx/ha)	1000-grain weight (g)
T1	4.28a	2.10a	2.15a	217a	14.09a	43.95a
T2	4.21a	1.92a	2.24a	227a	13.97a	40.82a
T3	4.49a	2.00a	2.36a	189a	14.61a	42.51a
T4	3.95a	1.62a	2.29a	199a	14.38a	42.60a
Pr>F	0.843	0.618	0.503	39.64	3.64	4.09
LSD	0.628	0.425	0.841	0.211	0.982	0.482

Conclusion

- No significant difference between treatments for the majority of parameters measured (physiological and agronomic parameters) under CA and CT systems
- Significant increase of 1000-grain weight (g) under T4 (100 % of residue keeping in the soil surface) under CA, which is due to the increase of the water availability during the filling stage of durum wheat.
- Yield components of durum wheat improved under CA compared to CT.
- Keeping 50 % of residues in the soil surface did not affect the agro-physiological performances of durum wheat under CA

→ Afeter durum harvest 50 % of residues can be grazed by livestock and 50 % retained in the soil surface as mulch

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