Coffee Roast Analysis: Guatemala Batches R14, R15, R16

Comparative Roast Overview

R14 (12:36:49)

- **Green Weight**: 150g → **Final Weight**: 127g
- **Weight Loss**: 15.3% (23g)
- **Total Roast Time**: 10:10 (610.5 seconds)
- **First Crack**: Heavy FC noted

R15 (12:53:31)

- **Green Weight**: 150g → **Final Weight**: 128g
- **Weight Loss**: 14.7% (22g)
- **Total Roast Time**: 11:11 (670.5 seconds)
- **First Crack**: Light FC noted

R16 (14:33:27)

- **Green Weight**: 150g → **Final Weight**: 128g
- **Weight Loss**: 14.7% (22g)
- **Total Roast Time**: 10:10 (610.5 seconds)
- **First Crack**: Light FC noted

Temperature Profile Comparison

Key Temperature Milestones

Metric	R14	R15	R16
Charge BT	138.3°C	153.2°C	151.4°C
Charge ET	96.8°C	111.5°C	105.7°C
Turning Point	115.5s (101.6°C BT)	88.5s (119.0°C BT)	69.0s (119.1°C BT)
Dry End	370.5s (147.8°C BT)	325.5s (155.1°C BT)	270.0s (152.7°C BT)
First Crack	442.5s (165.0°C BT)	495.0s (170.8°C BT)	436.5s (168.6°C BT)
Drop	610.5s (179.9°C BT)	670.5s (182.6°C BT)	610.5s (181.1°C BT)

Phase Duration Analysis

Phase	R14	R15	R16
Drying Phase	370.5s (61%)	325.5s (49%)	270.0s (44%)
Maillard Phase	72.0s (12%)	169.5s (25%)	166.5s (27%)
Development Phase	168.0s (27%)	175.5s (26%)	174.0s (29%)

Rate of Rise Comparison

RoR Metric	R14	R15	R16
Overall RoR	9.5°C/min	6.6°C/min	6.9°C/min
Dry Phase RoR	10.9°C/min	9.1°C/min	10.0°C/min
Mid Phase RoR	14.3°C/min	5.5°C/min	5.7°C/min
Finish Phase RoR	5.3°C/min	4.0°C/min	4.3°C/min
First Crack RoR	10.3°C/min	2.1°C/min	3.1°C/min

Detailed Analysis by Roast

R14 Analysis - The Problematic Profile

Critical Issues:

- **Severely unbalanced phases**: 61% drying time is excessive
- **Compressed Maillard phase**: Only 12% of total time stunts flavor development
- **Unstable RoR**: Wild swings from 10.9 to 14.3 to 5.3°C/min
- **Too aggressive mid-phase**: 14.3°C/min RoR will create harshness
- **Hot first crack**: 10.3°C/min at FC indicates lack of control

Expected Cup: Baked, underdeveloped flavors with potential harshness

R15 Analysis - The Conservative Approach

Strengths:

- **Better phase balance**: More reasonable drying (49%) and Maillard (25%) distribution
- **Stable development**: Consistent 4.0°C/min finish phase RoR
- **Controlled first crack**: Very gentle 2.1°C/min at FC

Weaknesses:

- **Too long overall**: 11:11 total time will mute brightness
- **High charge temperature**: 153.2°C BT creates aggressive start
- **Slow overall development**: 6.6°C/min overall RoR may lack intensity

Expected Cup: Muted but balanced, lacking vibrancy

R16 Analysis - The Most Promising

Strengths:

- **Best phase balance**: 44% dry, 27% Maillard, 29% development
- **Good development ratio**: 28.5% is optimal for balance
- **Reasonable timing**: 10:10 preserves more origin character than R15

Areas for improvement:

- **Still high charge temperature**: 151.4°C BT
- **Fast turning point**: 69 seconds doesn't allow enough heat soak

Expected Cup: Most balanced of the three, good body with moderate acidity

Progression and Learning Analysis

The three roasts show a clear learning progression:

R14 → R15: You recognized the phase imbalance and extended the Maillard phase from 12% to 25%, but overcorrected with total time.

R15 → R16: You shortened the overall time while maintaining good phase balance, showing better heat management skills.

Key Insight: R16 represents your best understanding of phase management, but all three roasts suffer from high charge temperatures.

Comprehensive Recommendations

Immediate Next Steps (Priority 1)

1. **Reduce charge temperature to 135-140°C BT** - This is your biggest issue across all three roasts
2. **Extend turning point to 90-120 seconds** - Allow proper heat penetration
3. **Target 8:30-9:30 total roast time** - Preserve Guatemala's brightness

Heat Management Strategy (Priority 2)

1. **Start with 40-50% less initial heat** than current approach
2. **Make smaller, more frequent adjustments** rather than large changes
3. **Plan heat reductions in advance** - don't wait for temperature to run away

Phase Timing Targets

- **Drying Phase**: 3:30-4:00 (40-45% of total time)
- **Maillard Phase**: 2:00-2:30 (25-30% of total time)
- **Development Phase**: 2:30-3:00 (25-30% of total time)

Expected Cup Profiles

Roast	Body	Acidity	Sweetness	Balance	Overall
R14	Medium	Low	Poor	Unbalanced	Avoid
R15	Full	Low-Medium	Good	Balanced	Acceptable
R16	Medium-Full	Medium	Good	Good	Best of three

Next Roast Action Plan

Pre-Roast Setup

- Charge at **140°C BT maximum**
- Start burner at **30-40%** of your current setting
- Plan to hit dry end at **3:45**
- Target first crack at **6:45**

During Roast Adjustments

- **0-2:00**: Focus on gentle, consistent rise
- **2:00-4:00**: Gradual heat reduction to control RoR
- **4:00-7:00**: Maintain 4-6°C/min RoR through Maillard
- **7:00-drop**: 3-4°C/min through development

The progression from R14 to R16 shows real improvement in your understanding of roast phases. Focus on charge temperature and you should see significant cup quality improvements.