INVESTIGATION BURLEY TOBACCO QUALITY IN HORIZONTAL STALK CUT CURING AND USING OF DESICCANTS

D. Drachev, V. Nikolova, V. Petrova, N. Shumarski
Tobacco and Tobacco Products Institute, Plovdiv, Bulgaria

ABSTRACT
The investigation on consumer qualities of Burley tobacco puts on its inevitable participation in “american blend” cigarettes. Its higher balance moisture defines bigger pliability to microbiological damages /get mould/, which put continuous control and regulation its moisture. The offered technology for horizontal curing of stalk cut Burley tobacco treated of desiccants reveals possibilities for improving quality in decreased continuation of curing. The aim of investigation is study of technology of stalk cut horizontal curing with using of desiccants and its influence to Burley tobacco quality. The investigation has made in two kinds of arranging: vertical hanging up without plants treating /control/ and horizontal arranging: control – untreated tobacco; treating with “Reglon” and treating with “Roundup”. The chemical composition, physical indexes of tobacco and smoke composition are determined for quality evaluation. In result of investigation influence of desiccants in stalk cut horizontal curing of Burley tobacco type is determined that using of desiccants is an effective method for process precipitation and its quality is improved in determinate stage.

Introduction
The investigation on consumer qualities of Burley tobacco puts on its inevitable participation in “american blend” cigarettes in which it puts in 20-35% of its composition (2, 6, 10). The investigations of number of authors find disturbed typicalness of Bulgarian Burley mainly because of unsuitable making of areas, lack of correspondence cropping practice for growing type and disturbed curing technology (3, 4, 5, 7, 9).

It’s known that Burley tobaccos type have characteristic technological properties, which form in result of curing method – air on the shadow and of genetics features of type. Its specific biological features, leaves structure and of genetics composition define its ability to absorb relatively more quick and more water vapour from environment in which it is occur i.e. its higher balance moisture. This property defines higher pliability to micro biological damages /get mould/ which put continuous control and regulation its moisture. It is possible by offered technology for horizontal curing of stalk cut Burley tobacco treated with desiccants. The possibilities are revealed for improving quality in decreased curing continuation by which the yield increases expressed by slighter stage of dry matter decreasing.

The aim of present investigation is study technology of stalk cut horizontal curing with using desiccants and its influence on Burley tobacco quality.

Materials and Methods
The investigations are conducted with Burley tobacco – variety 1317. Good cultivated plants were chosen for the aim – 150 in number. The watering was made after deep topping – to 16th leaf in the stage of
beginning of flowering and suckers remove. The plants were cut and remained in the field to wither – 24h. The stalk arranging is made with control /untreated/ and with variants, treated with two kinds desiccants on two floors in dryer type “Slight shelter” in horizontal placing of plants – 25-27 plants on linear meter. The second control uses with vertical hanging up plants, /untreated/ i.e. by traditional method of curing.

The plants arranged with yellowing down stalk position and initial yellowing of leaves of middle stalk position. The leaves sizes were over 30-35 cm.

The treatment is made with desiccants – “Reglon” and “Roundup” in the zone of connection of main vein to stalk. It is realized after conducting the stage of yellowing including the top leaves in concentration of solution: 100ml in 10 l water. The desiccant falling didn’t allow on the blade and the stem by this method of treatment.

The investigation is completed for following experimental variants:
- Control – untreated tobacco /vertical plants hanging up/;
- Control – untreated tobacco /horizontal arranged plants/;
- Treatment by “Reglon” – horizontal arranged plants (RN);
- Treatment by “Roundup” - horizontal arranged plants (RP).

The tobacco of different variants /quality tobacco – I grade/ is investigated in respect of following chemical and technological indexes:

Tobacco chemical composition: nicotine, %; reduced sugars, %; overall nitrogen, %; ashes, %; ether extract, %; potassium. % and chlorine, %.

Smoke composition: tars, mg/cig and nicotine, mg/cig.

Physical indexes: stem, %; cut tobacco density, g/cm³; conventional cigarette output, num.cig/kg tobacco and ability for burning, s.

The determination of these indexes is completed by known and used in practice routine methods. Tobacco smoke composition was determined by method, described by Popova and Georgiev (8).

**Results and Discussion**

The plants put on stretched parallel wires in experimental technology of horizontal arranging and that the leaves are oriented regularly on stalk length from its two sides and optimum conditions create for moisture separation in curing. In this case the stalks play role of laths as in curing by leaves.

The leaves don’t touch thick, don’t stick and don’t darken in curing in this method and density of plants arranging and conditions haven’t for get mould. Other advantage is that the connections of main veins with stalk remain in zone what air the strongest.

The decreasing continuation of curing sample about with 10 days finds in this method of arranging and curing, treated with desiccant “Reglon” in comparison to control - horizontal arranged tobacco. It is due to connection break between stalk and stem in zone of treatment with desiccant.

The differences with control don’t observe for plants treated with “Roundup”.

The quality of cured tobacco was determined organoleptical by expert evaluation by external quality indications. The yellowish spots of blade don’t find which are unfavourable quality indications for Burley tobacco in completed expert check of all variants.

**Expert evaluation**

The expert commission ranks samples separately for control and experimental variants – horizontal arranging of first and second row and for control – vertical hanged up plants on base complex manifesting elements of quality.

Tobacco ranking /rating/ of two rows of arranging is following:

**For horizontal arranging**

I row:
- treated with “Reglon” – (RN);
### Tobacco chemical indexes

<table>
<thead>
<tr>
<th>Indexes</th>
<th>Control vertical</th>
<th>I row</th>
<th>II row</th>
<th>Control vertical</th>
<th>II row</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>horizontal</td>
<td>R-N</td>
<td>R-P</td>
<td>horizontal</td>
</tr>
<tr>
<td>Tobacco chemical composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nicotine, %</td>
<td>3.00</td>
<td>3.06</td>
<td>4.21</td>
<td>3.70</td>
<td>3.24</td>
</tr>
<tr>
<td>Reduced sugars, %</td>
<td>0.20</td>
<td>0.13</td>
<td>n.d.</td>
<td>n.d.</td>
<td>0.17</td>
</tr>
<tr>
<td>Overall nitrogen, %</td>
<td>2.90</td>
<td>3.30</td>
<td>3.45</td>
<td>3.52</td>
<td>2.61</td>
</tr>
<tr>
<td>Ashes, %</td>
<td>17.20</td>
<td>17.10</td>
<td>17.00</td>
<td>16.80</td>
<td>17.50</td>
</tr>
<tr>
<td>Chlorine, %</td>
<td>0.68</td>
<td>0.62</td>
<td>0.33</td>
<td>0.50</td>
<td>0.85</td>
</tr>
<tr>
<td>Potassium, %</td>
<td>2.44</td>
<td>1.12</td>
<td>1.90</td>
<td>2.21</td>
<td>1.92</td>
</tr>
<tr>
<td>Niesler number (K2O/Cl)</td>
<td>3.59</td>
<td>1.81</td>
<td>5.76</td>
<td>4.42</td>
<td>2.26</td>
</tr>
<tr>
<td>Ether extract, %</td>
<td>10.34</td>
<td>8.10</td>
<td>9.59</td>
<td>10.00</td>
<td>9.41</td>
</tr>
<tr>
<td>Smoke chemical composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tars, mg/cig</td>
<td>35.29</td>
<td>20.25</td>
<td>28.64</td>
<td>32.08</td>
<td>27.29</td>
</tr>
<tr>
<td>Nicotine in smoke, mg/cig</td>
<td>2.20</td>
<td>2.24</td>
<td>3.21</td>
<td>2.76</td>
<td>2.38</td>
</tr>
</tbody>
</table>

control – untreated tobacco;
treated with “Roundup” – (RP)

II row
control – untreated tobacco;
treated with “Reglon” – (RN);
treated with “Roundup” – (RP)

The best results are obtained for horizontal arranged plants of first row for variant – treating with “Reglon”(RN), following by control – untreated tobacco. The arranging is following for second row: control – untreated tobacco is better than variants treated with desiccants.

**Comparison between controls**
control – horizontal arranged plant – I and II row;
control – vertical hanging up of plants

The best place takes in ranking control – untreated tobacco /vertical hanging up of plants/ in comparison between two controls.

**Chemical indexes**

The chemical analysis are presented in Table 1.

The data of table show that nicotine content/from 3.00% to 4.21%/ is characteristic for type and by this index the investigated tobacco answer to this produced in typical countries producers of Burley tobacco. It’s higher pointed for samples treated with desiccants. There aren’t significant differences between controls.

The reduced sugars content is minimum which is also characteristic feature for Burley type.

The overall nitrogen content varies from 2.6% to 3.55% which is in unison with typical american varieties in what its content moves in frame of 3.08-4.36% (2, 3, 9, 10). It’s higher for treated samples which correspond to nicotine content in samples with using of desiccants. Significant differences don’t determine in reduced sugars content and this one of overall nitrogen in control variants comparison.

The ash content /mineral composition/ has importance for total quality and ability for burning like ability for burning catalyst /characteristic index for Burley tobacco/. The results of our investigations show significant lower content /16.30-18.10%/ in comparison to typical tobaccos of this type.

The role of components chlorine and potassium on tobacco ability for burning is known. The element chlorine is especially important for Burley tobacco which worsen its ability for burning. The data show that chlorine content is in frames of 0.30-0.85% as pointedly it is lower for samples treated with desiccants. In respect of these elements
Potassium and chlorine content don’t determine significant differences between controls for chlorine content. Comparatively higher potassium content finds for control – vertical arranging. Potassium and chlorine like indexes influenced on ability for burning move in limitations characteristic for type independently on variants. The high values of Niesler number \((\text{K}_2\text{O}/\text{Cl})\) confirm better ability for burning of Burley tobacco (1).

It is determined on the whole, that in comparison of control and experimental variants /treated with desiccants/, chemical composition of treated samples doesn’t differ essential but by exact indexes is more favourable in respect of specific features of Burley tobacco composition.

The nicotine level in smoke for investigated samples correlate to this in tobacco \((2.20-3.21 \text{ mg/cig})\).

The tars content varies in very wide range – from 18.44 to 35.29 mg/cig. It is the highest for control – vertical hanging up of plants, lower for variant treating with “Reglon” /horizontal arranging plants, II row/. It has interstitial values. The tars content is lower in comparison of control /horizontal arranging/ of first row with treated samples, for second – vice versa for two desiccants. These changes can’t be explain other way except for lack of homogeneity or identity of analyzed samples which can realize difficult in practice.

### Physical indexes

Data for physical indexes of investigated tobacco are presented in Table 2.

The leaves are obtained with size over 48 cm in result of applied cropping practice /deep topping before plant cut/, referring to this element of quality to I grade.

The important technological index for Burley tobacco is the percentage of stem which for investigated samples is in limitations from 26.25 to 31.50\%. It is known that for Burley the percentage of stem is high /over 25\%. The results show that in process precipitation of curing with using desiccants in dependence on plant’s location /I or II row/ obtained compacting of leaf tissue /the tobacco become heavier/ as the control from I and II row is with the lowest value in comparison to treated samples.

The control samples from I and II row are with better ability for burning in comparison to treated, as the differences don’t
determine between treated samples.

Conclusions
The following is determined in result of testing influence of desiccants in stalk cut horizontal curing of Burley tobacco type:

1. Chemical composition of tobacco and tobacco smoke:
   1.1. Using of desiccants in curing don’t influence essential on chemical composition but by some indexes the quality improve:
   - The nicotine content is higher in using desiccants than this one of controls;
   - The reduced sugars, overall nitrogen and ashes don’t differ essential and it is in limitations of typical levels for this type;
   - In respect of other components of tobacco composition haven’t essential differences;
   - The tobacco smoke composition in using desiccants haven’t essential differences in comparison to controls without applying the same;
   - In comparison of control samples /horizontal and vertical arranging/ differences don’t determine.

2. The deviations don’t find from characteristic for type for physical indexes.

3. The process labour-consumption shortens significant for offered method of arranging; the defoliation and grouping by stalk positions facilitate; the necessity of curing area decreased.

4. The horizontal stalk cut curing of Burley tobacco with using desiccants is effective method for process precipitation and improves its quality in some measure.

REFERENCES