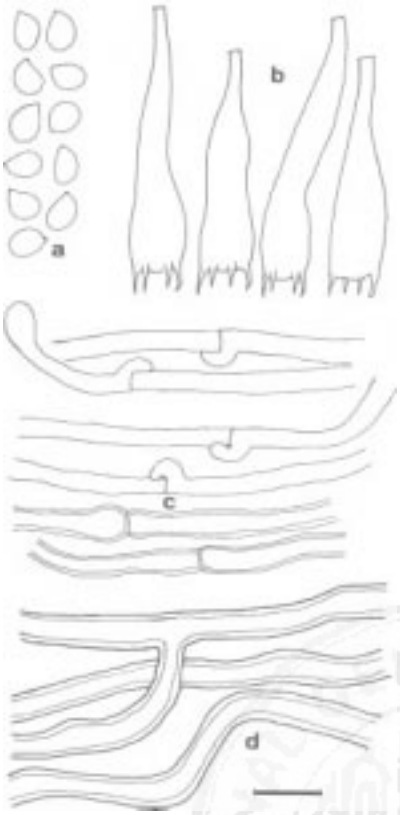
(a)

(b)



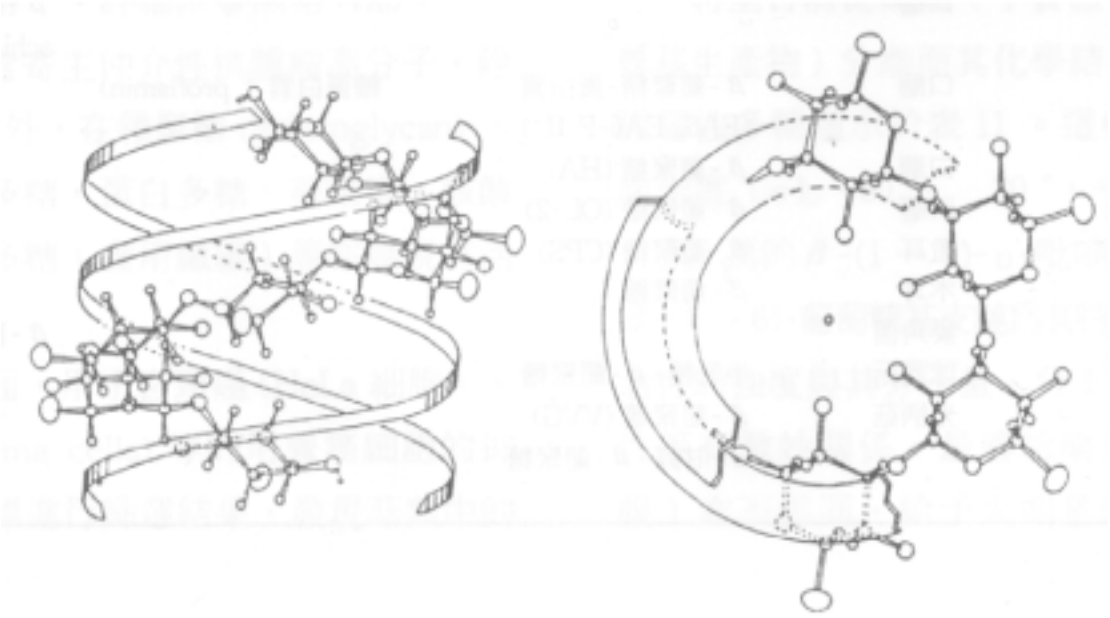
a, Basidiospores; b, Basidia;
c, Generative hyphae;
d, Skeletal hyphae. Bar = 10 μm.

圖一(a) 舞菇子實體外觀

(b) 舞菇菌絲

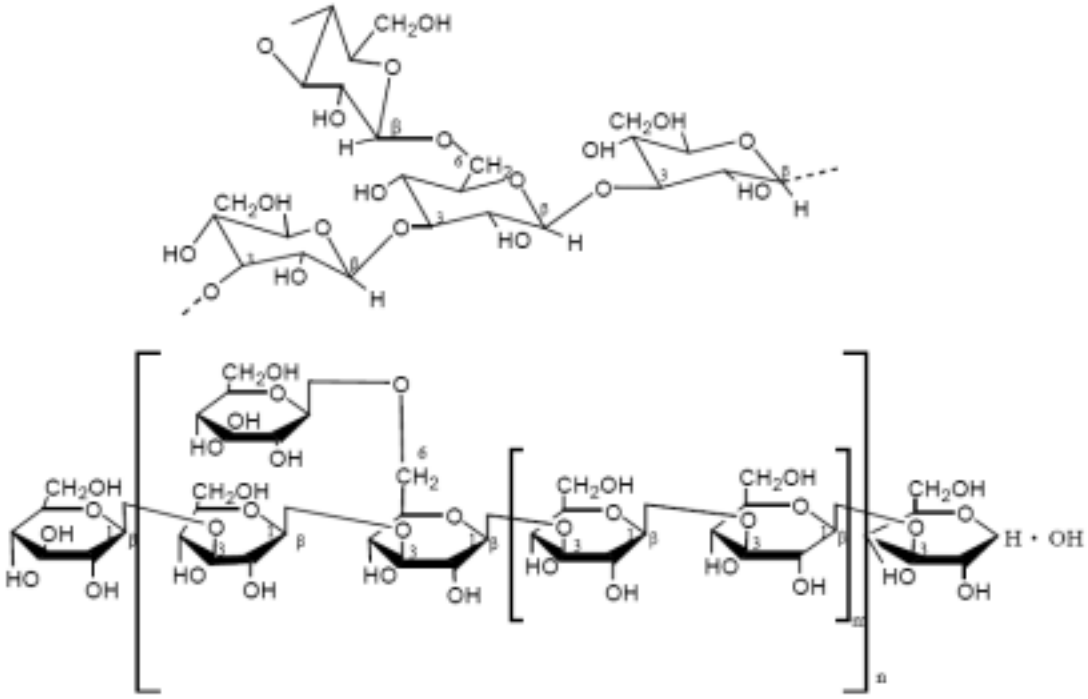
Fig.1(a) Fruting body of *G. frondosa* (Source:中國科普博覽; FOTKI)

Fig.1(b) Mycelium of *Grifola frondosa* (Chang and Chou, 2003)



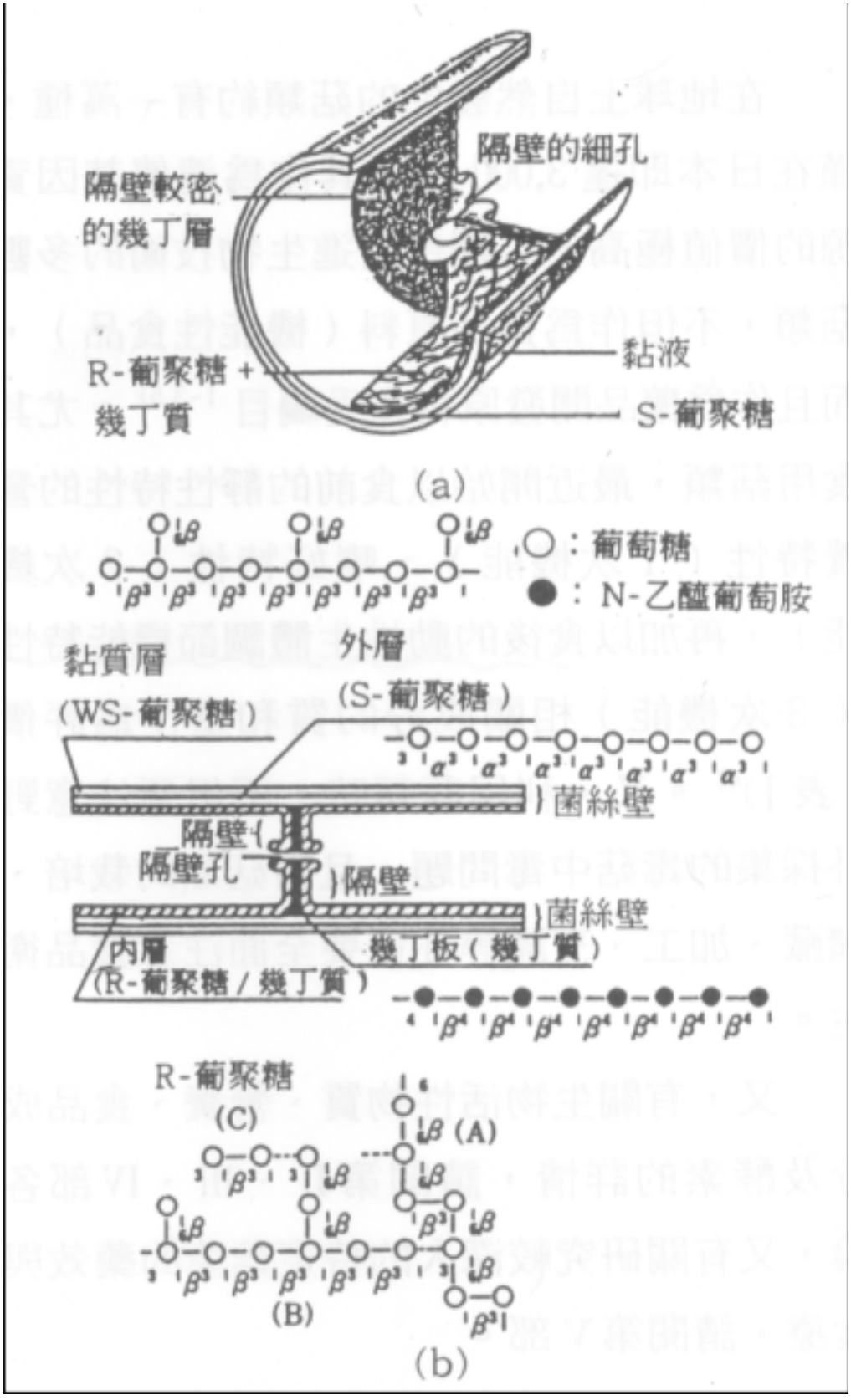
圖二　β-1→3、β-1→6-D-葡聚醣立體結構（Source:水野和川合,1999）

Fig.2 Three-dimensional structure of β-1→3、β-1→6-D-glucan.



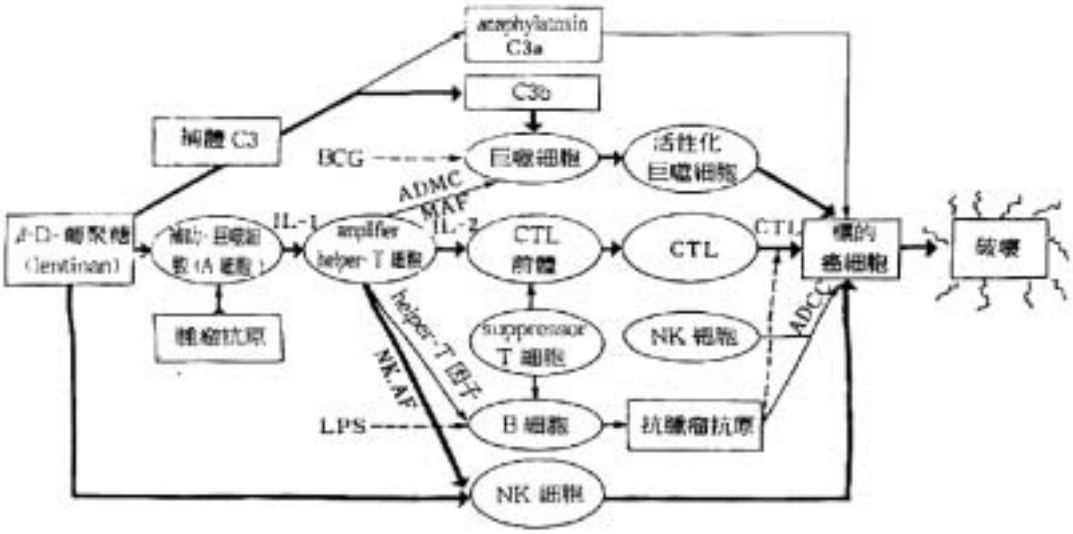
圖三　有抗腫瘤活性的β-1→3-D-葡聚醣結構（Source:水野和川合,1999）

Fig.3 Anti-tumor structure of β-1→3-D-glucan.



圖四　真菌細胞壁模型（Source:水野和川合,1999）

Fig.4 Model of Fungi Cell Wall

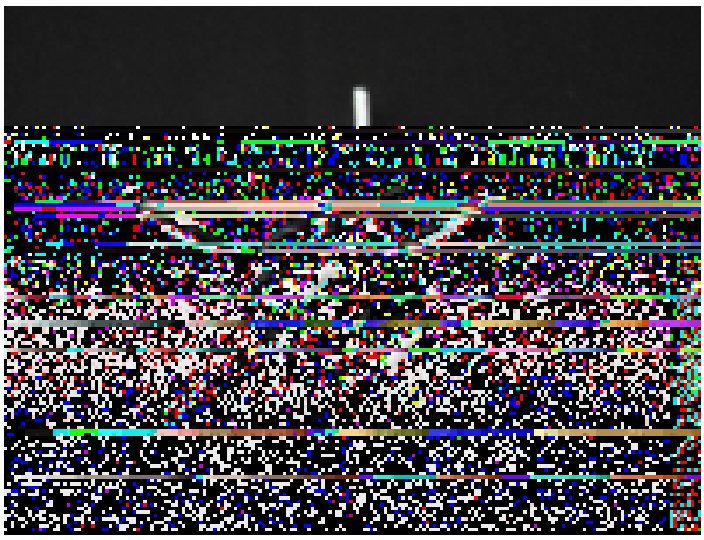


IL-1：interleukin 1, ADMC：抗體依賴性巨噬細胞傷害，MAF：巨噬細胞活化因子，CTL：細胞殺傷性 T 細胞，NK 細胞：自然性殺戮細胞，ADCC：抗體依賴性細胞傷害，AF：活化因子，LPS：脂多糖

圖五　β-D 葡聚醣多醣體的抗腫瘤作用之可能機制。(水野和川合,1999)

Fig.5 The possible anti-tumor defense mechanism of β- D glucan.

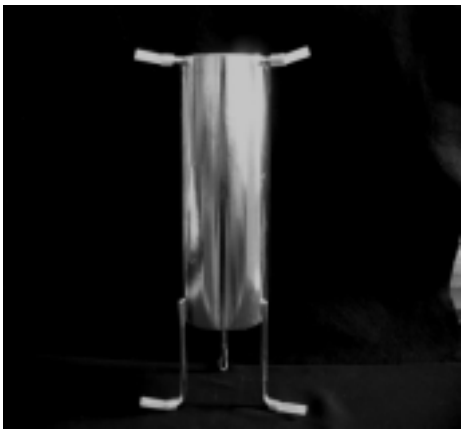
(a)



(b)

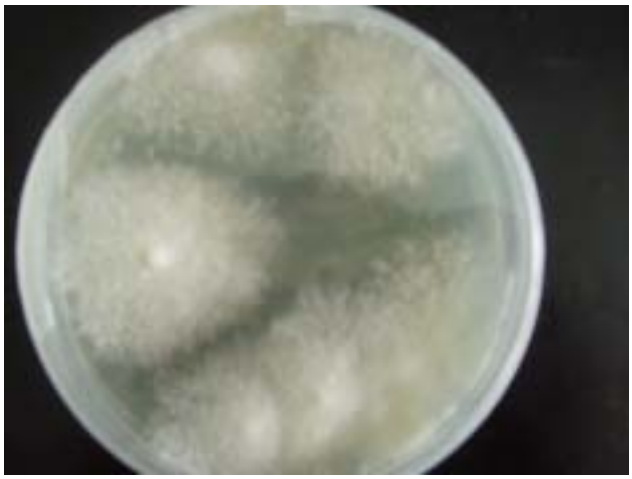
圖六(a) 標準式渦輪扇葉；(b) 船推進器型扇葉

Fig. 6(a) Standard turbine impeller; (b) Marine type impeller



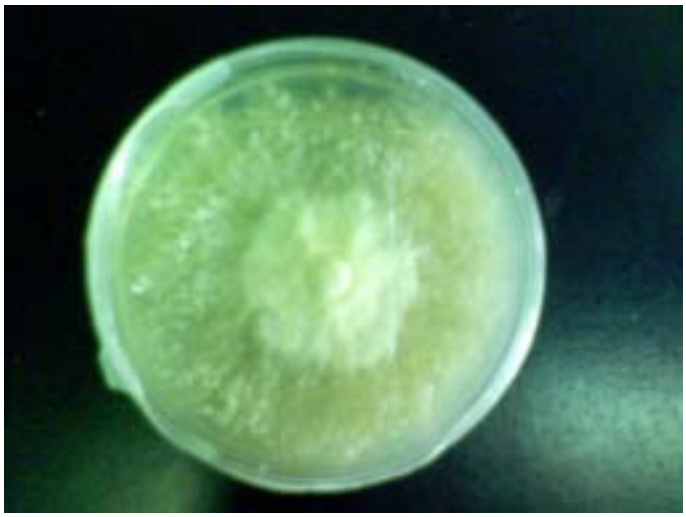
圖七　　氣舉式發酵槽槽內之導流管

Fig.7　Airlift fermentor and raught of airlift fermentor



圖八　經由劃線培養活化的舞菇菌絲（第七天）

Fig.8　Plate of *G. frondosa* on day 7.



圖九　經由再次活化的舞菇菌絲（第七天）

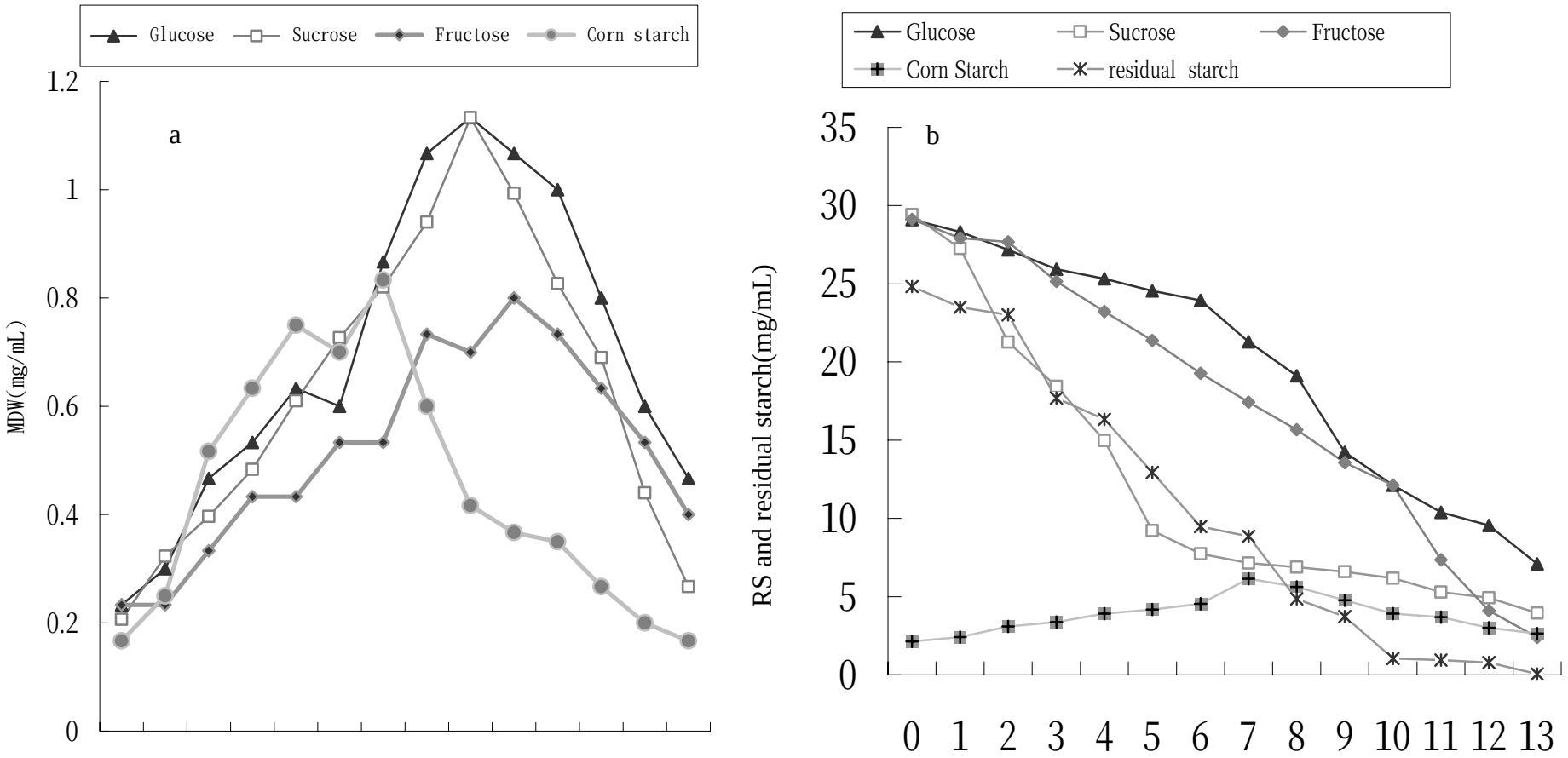
Fig.9　The second activation of *G. frondosa* on day 7.

圖十　在三角瓶內的舞菇菌酥（剛接種）

Fig.10　Starter PELLET of *G. frondosa* in the flask

圖十一 舞菇經過七天搖瓶培養之菌絲型態

Fig.11　Mycelial growth of *G. frondosa* after 7 days in shake flasks.



圖十二　不同碳源對舞菇發酵期間(a)菌絲體生長(b)發酵液還原糖和殘留澱粉的影響

Fig.12　Effect of different carbon sources on the (a) mycelium dry weight(MDW) (b) reducing sugar(RS) and residual starch in the fermentation of *G. frondosa*.

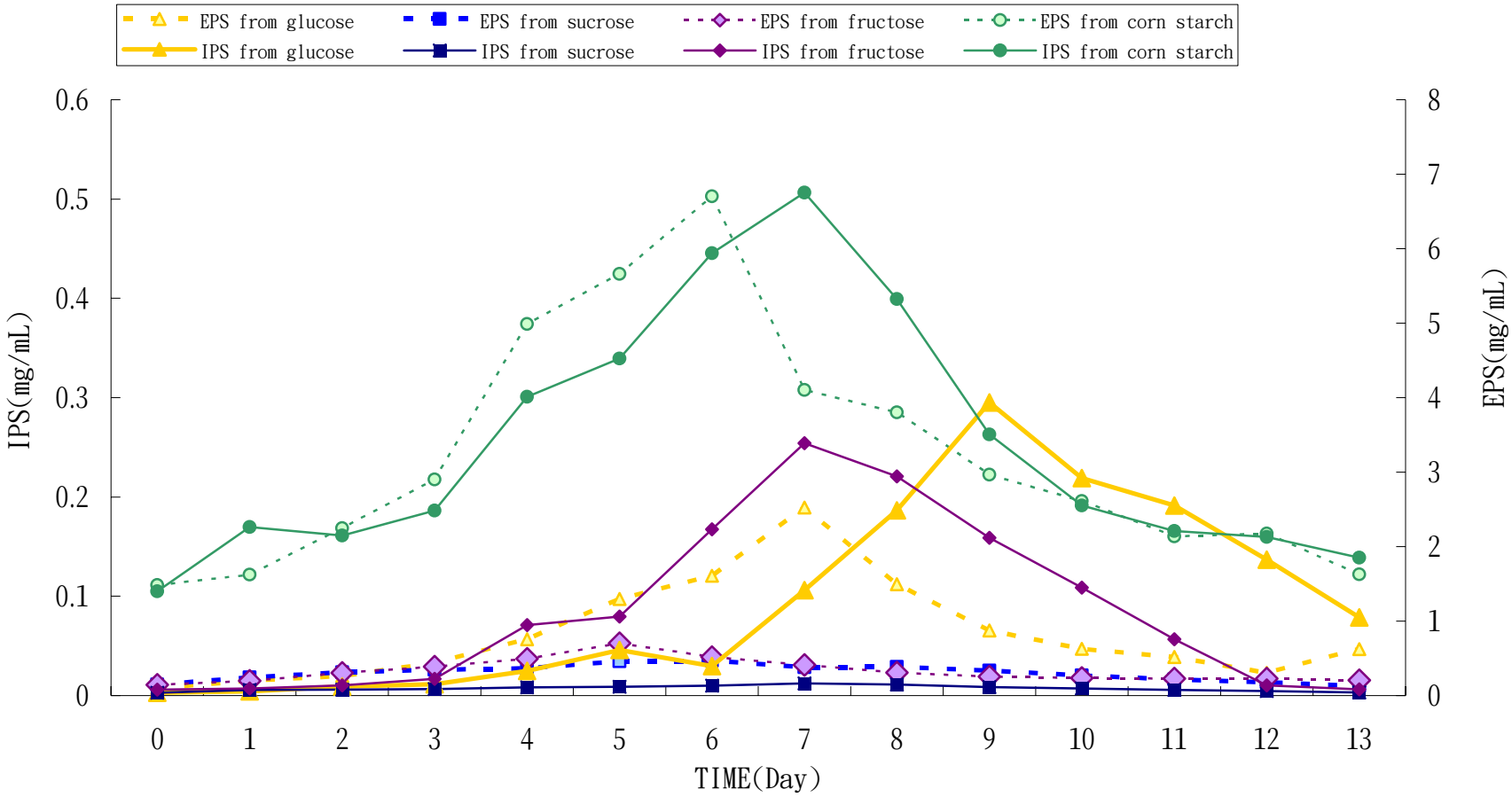
(a)

(b)

圖十三　舞菇以葡萄糖和玉米澱粉為碳源 進行搖瓶培養的形態

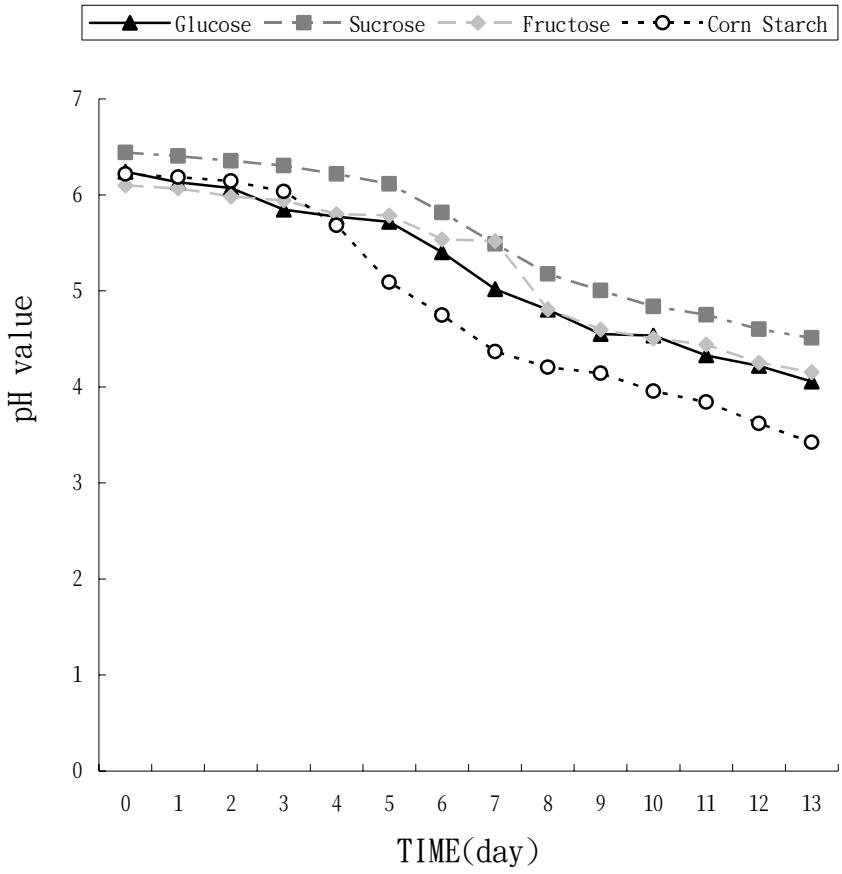
(a)glucose（第一天)；(b) corn starch（第一天）

Fig.13　Growth of *G. frondosa* is in shake flasks.(a)glucose (on day 1);(b) corn starch (on day 1)

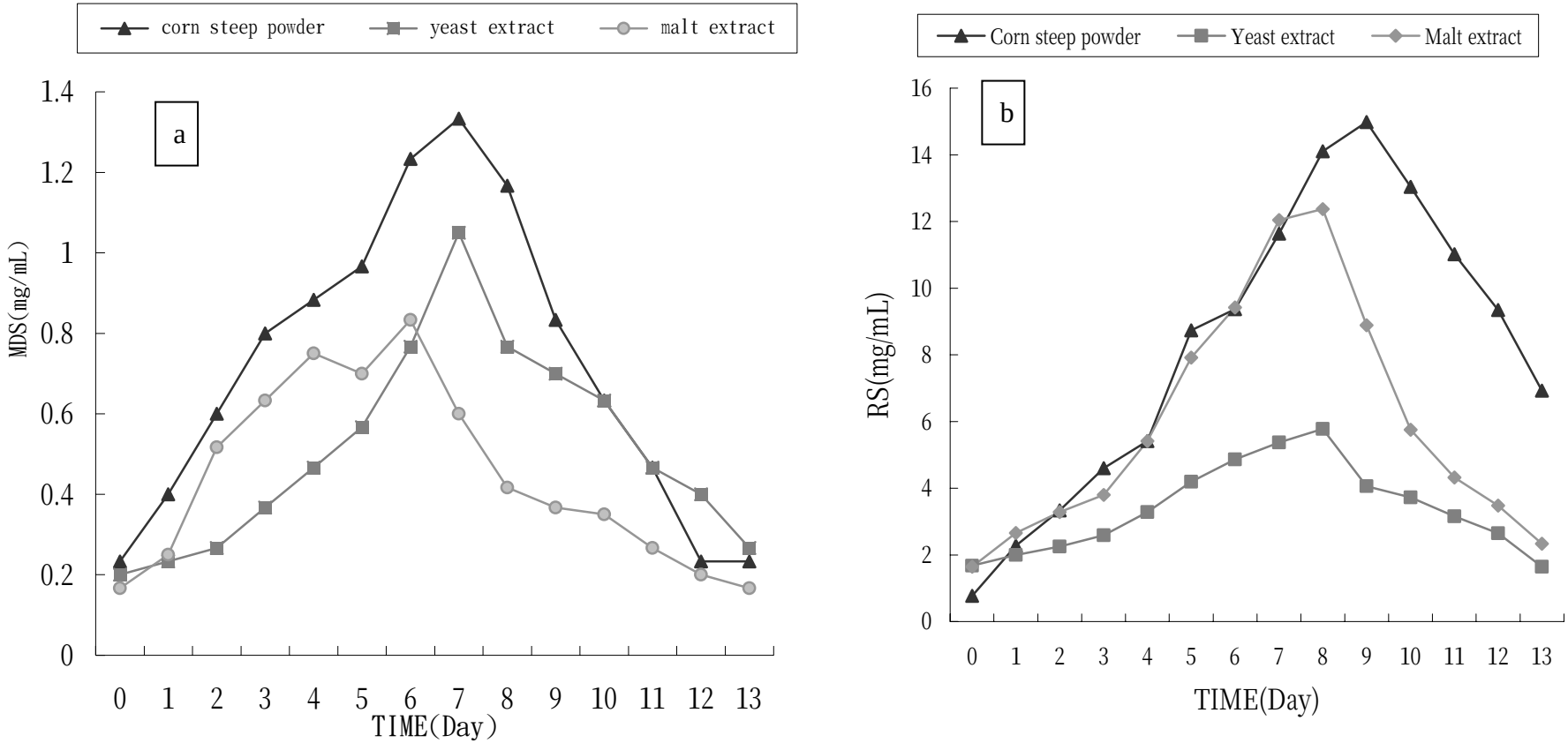


圖十四　不同碳源對舞菇發酵期間胞內與胞外多醣產量的影響

Fig.21　Effect of different carbon source on intra-polysaccharide(IPS) and exo-polysaccharide(EPS) content in the fermentation of *G. frondosa.*

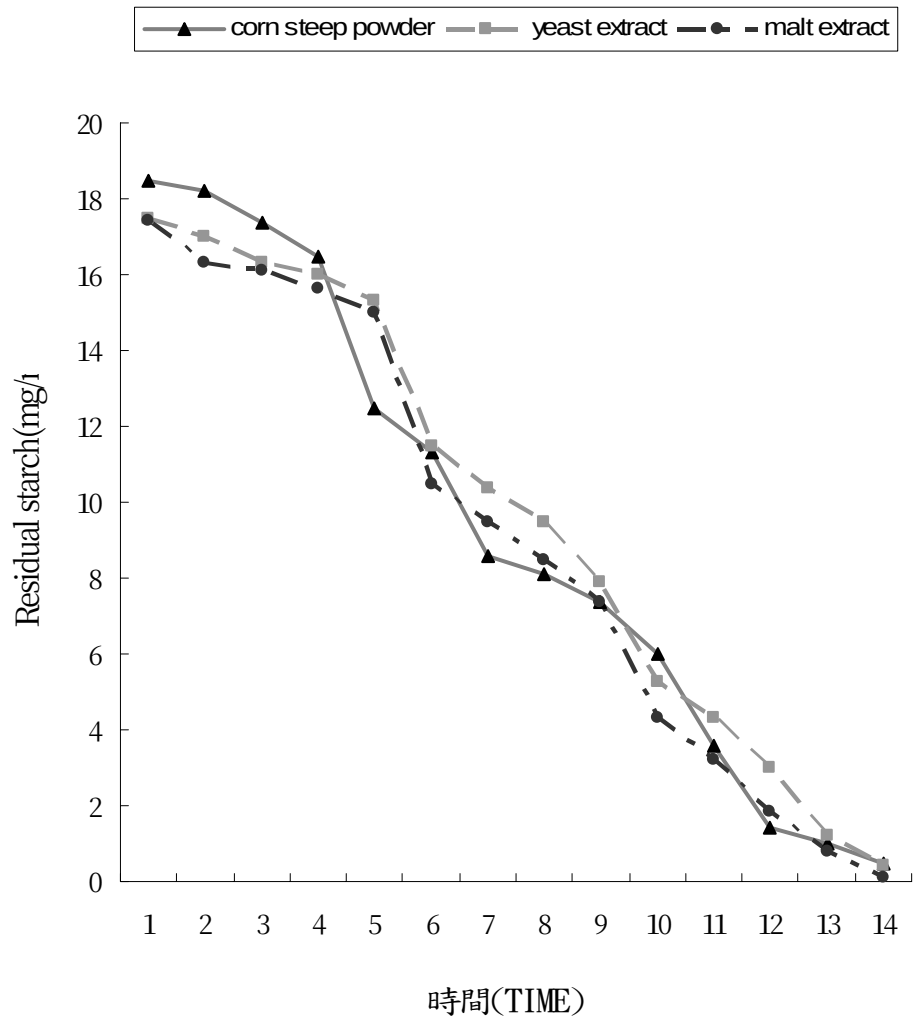


圖十五　不同的碳源對於舞菇發酵期間pH值的影響
Fig.15 Effect of different carbon sources on the change of pH in the fermentation of G. frondosa.



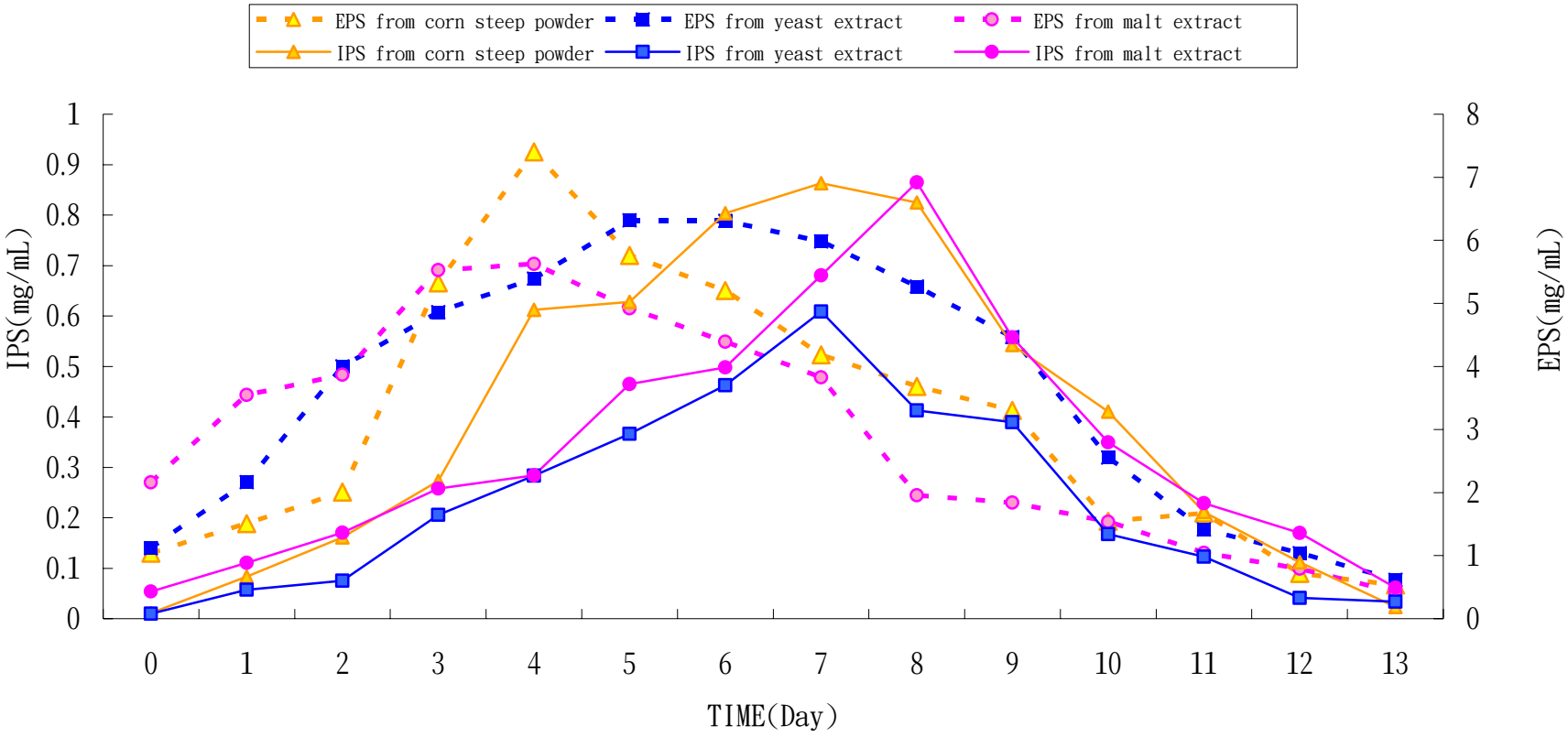
圖十六　不同氮源對舞菇發酵期間(a)菌絲體生長(b)發酵液還原糖的影響

Fig.16　Effect of different carbon sources on the (a) mycelium dry weight(MDW);(b)reducing sugar(RS) in the fermentation of *G. frondosa.*



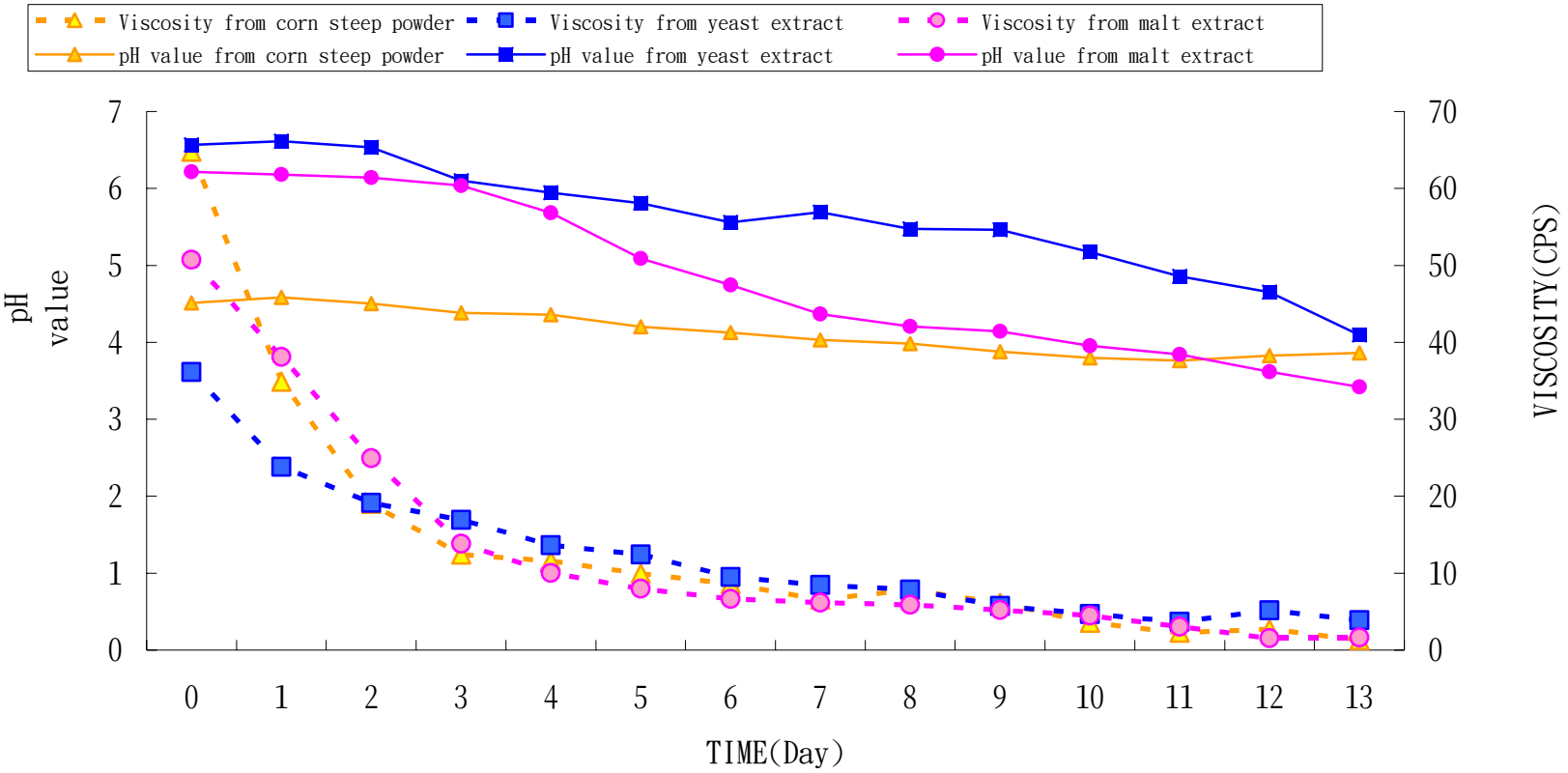
圖十七　不同氮源對舞菇發酵液殘留澱粉的影響

Fig.17 Effect of different nitrogen sources on residual sarch(re.s.) in the fermentation of *G. frondosa* .



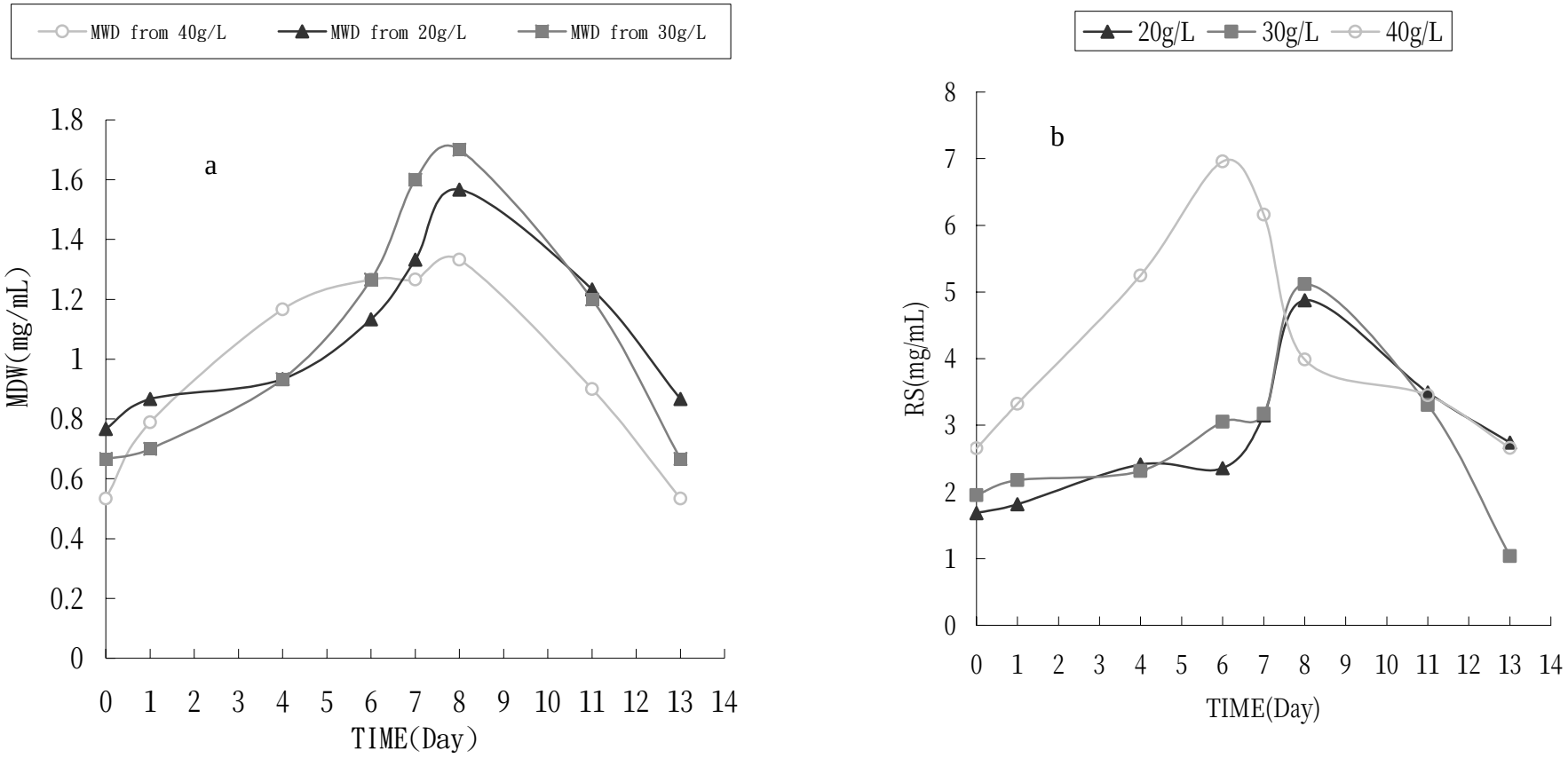
圖十八　不同氮源對舞菇發酵期間多醣體含量的影響

Fig.18　Effect of different nitrogen sources on polysaccharide during the fermentation of *G. frondosa*.



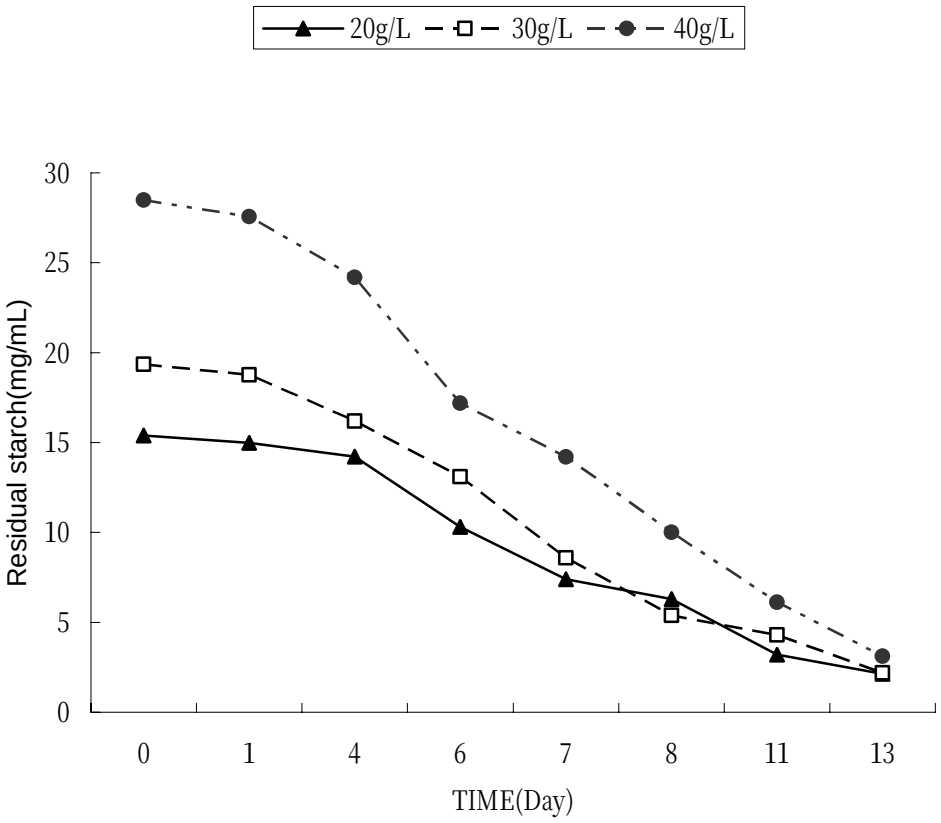
圖十九　不同氮源對舞菇發酵期間pH值和黏度的影響

Fig.19　Effect of differwnt nitrogen sources on pH value and viscosity during the fermentation of G. frondosa.

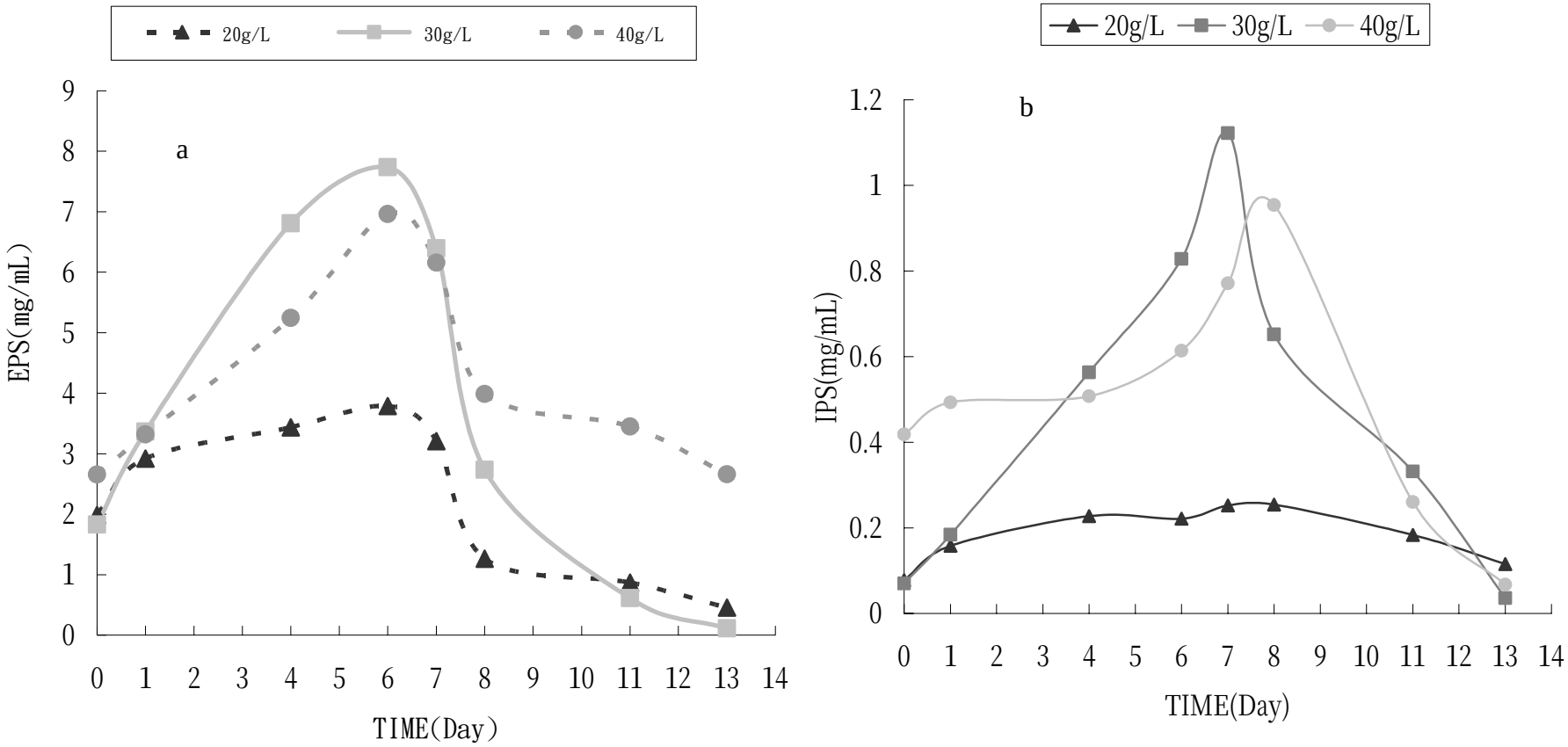


圖二十　不同的碳源濃度對舞菇發酵期間(a)菌絲體生長及(b)發酵液還原糖的影響

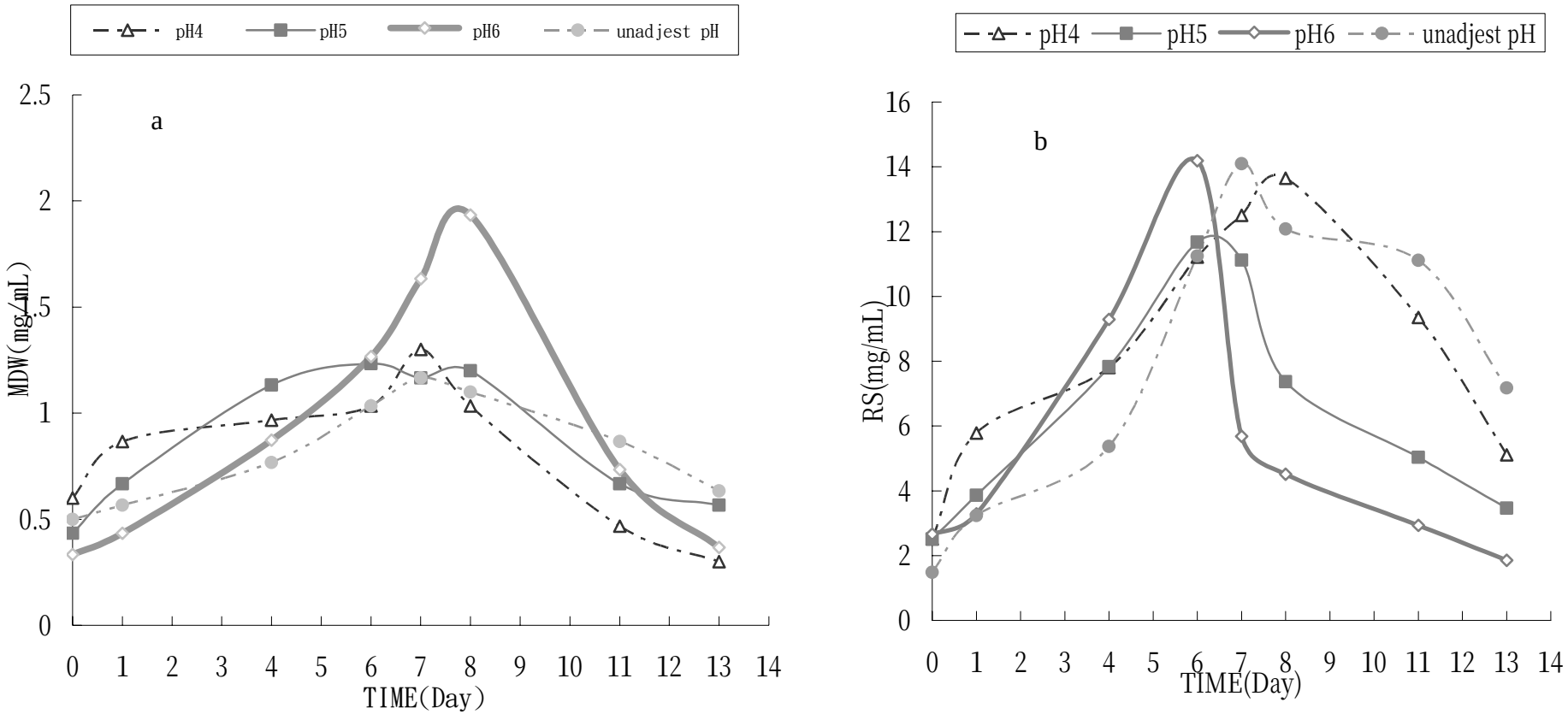
Fig.20　Effect of different initial carbon source concentration on the (a) mycelium dry weight(MDW);(b)reducing sugar(RS) in the fermentation of *G. frondosa*.



圖二十一　不同玉米澱粉濃度對舞菇發酵液澱粉殘留量的影響
Fig.21 Effect of different corn starch concentration on residual starch in the fermentation of *G. frondosa*.

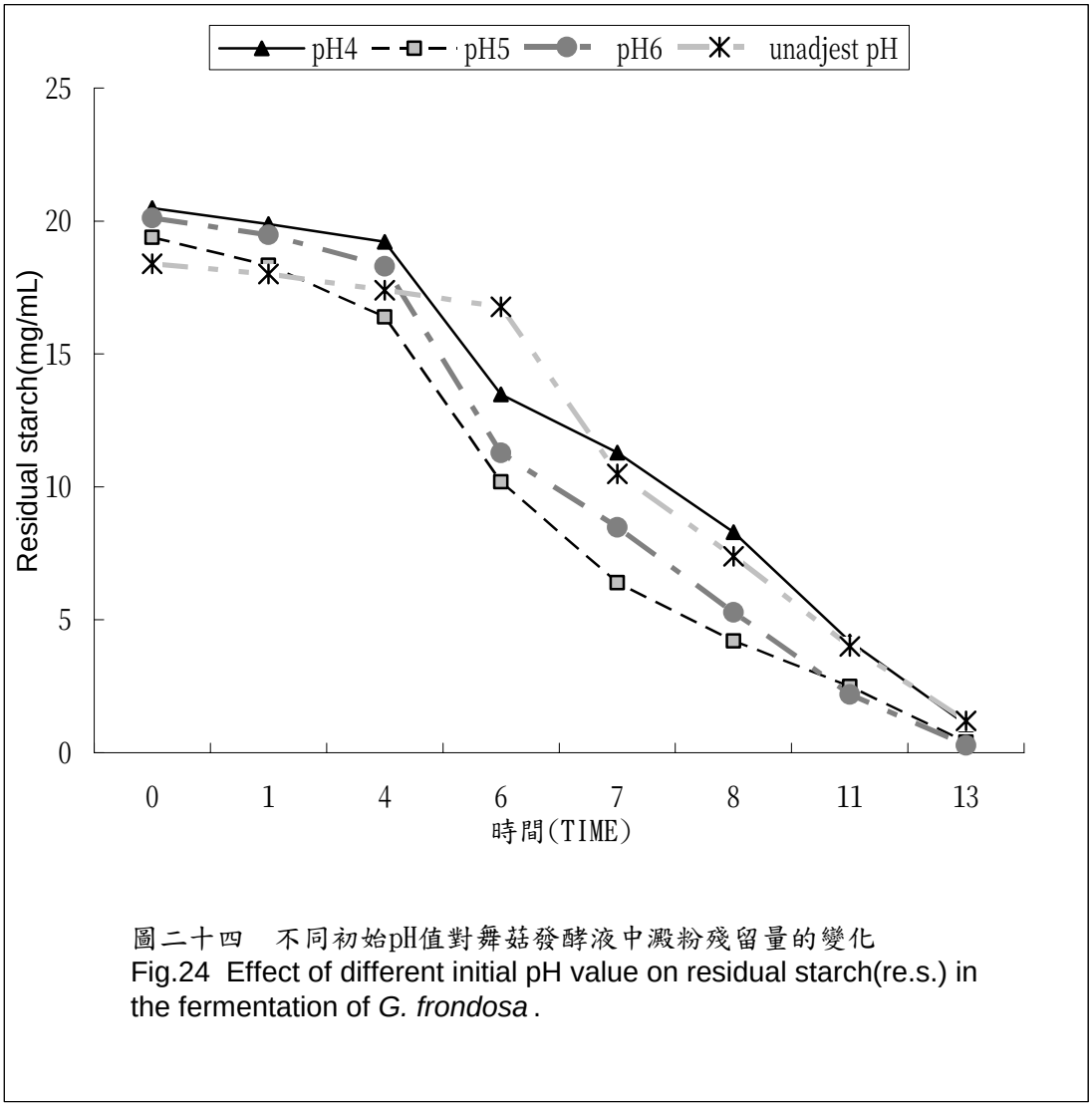


圖二十一　不同玉米澱粉的濃度對舞菇發酵期間多醣體含量的影響
Fig.21 Effect of different corn starch concentration on thr polysaccharide content during the fermentation of *G. frondosa*. ((a)EPS:Exo-polysaccharide;(b)IPS:Intra-polysaccharide)



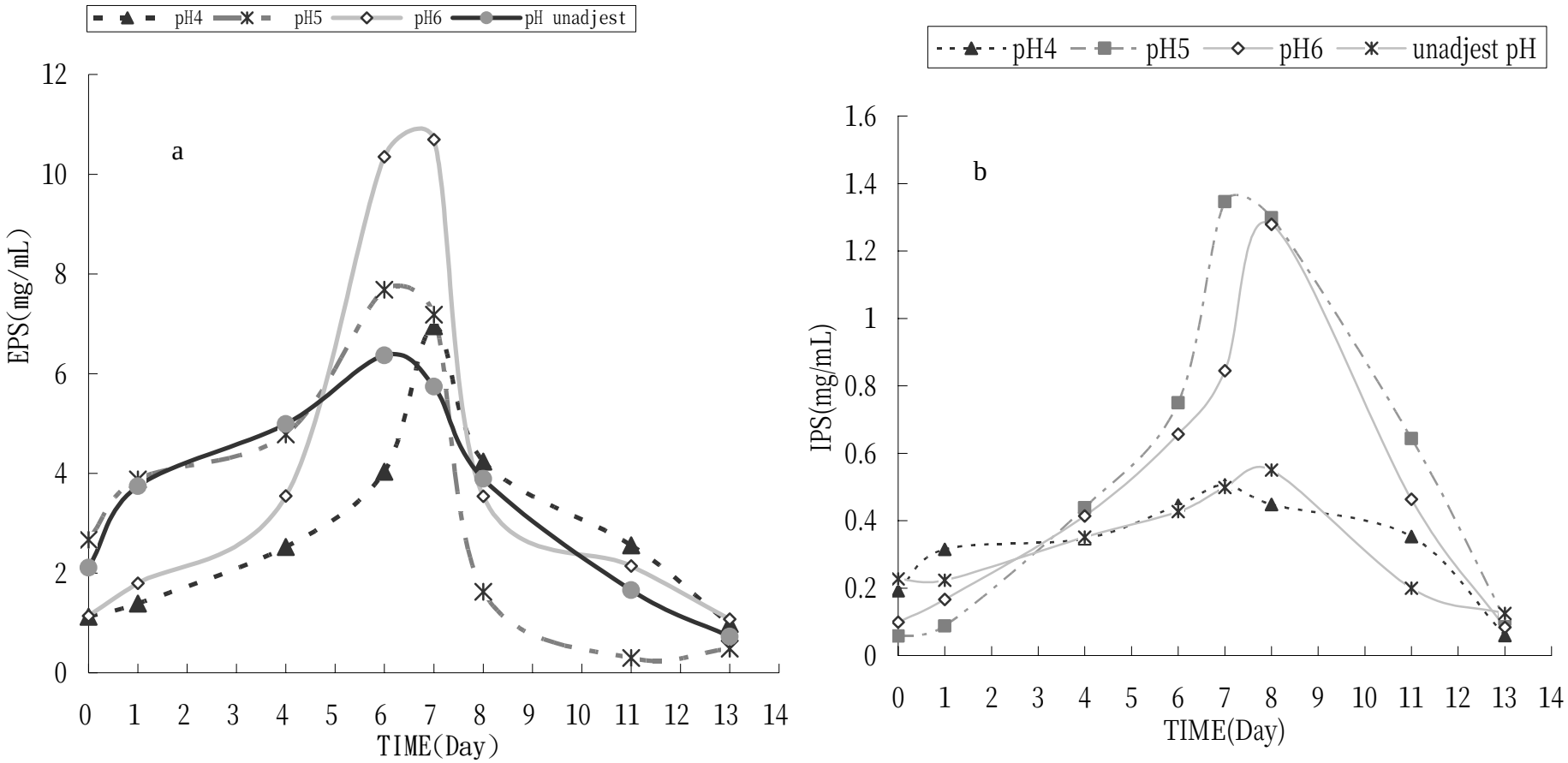
圖二十三　不同的初始 pH 值對舞菇發酵期間(a)菌絲體生長及(b)發酵液還原糖的影響

Fig.23　Effect of different initial pH on the (a) mycelium dry weight(MDW);(b)reducing sugar(RS) in the fermentation of *G. frondosa*.



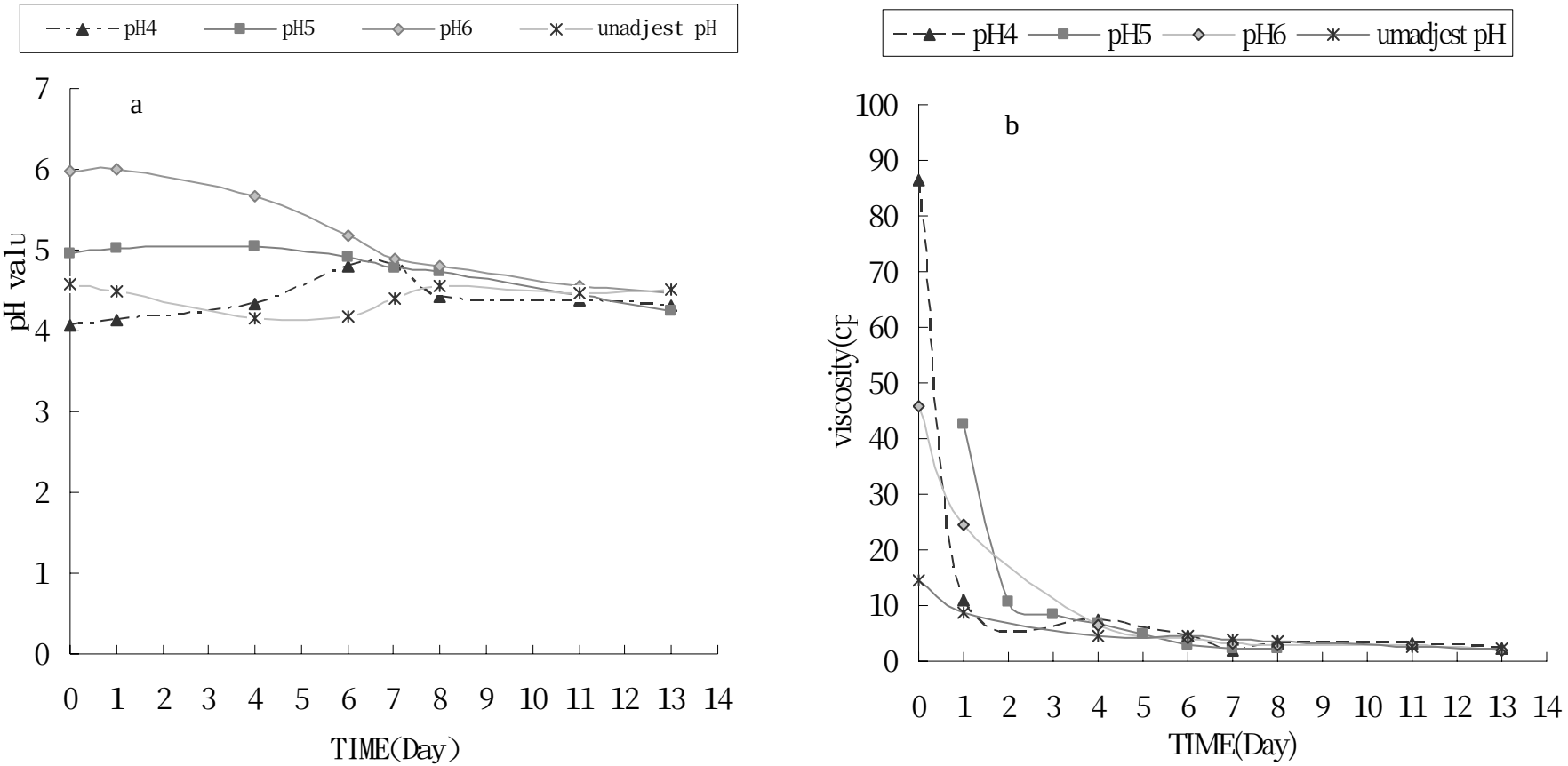
圖二十四　不同初始pH值對舞菇發酵液中澱粉殘留量的變化

Fig.24 Effect of different initial pH value on residual starch(re.s.) in the fermentation of *G. frondosa* .



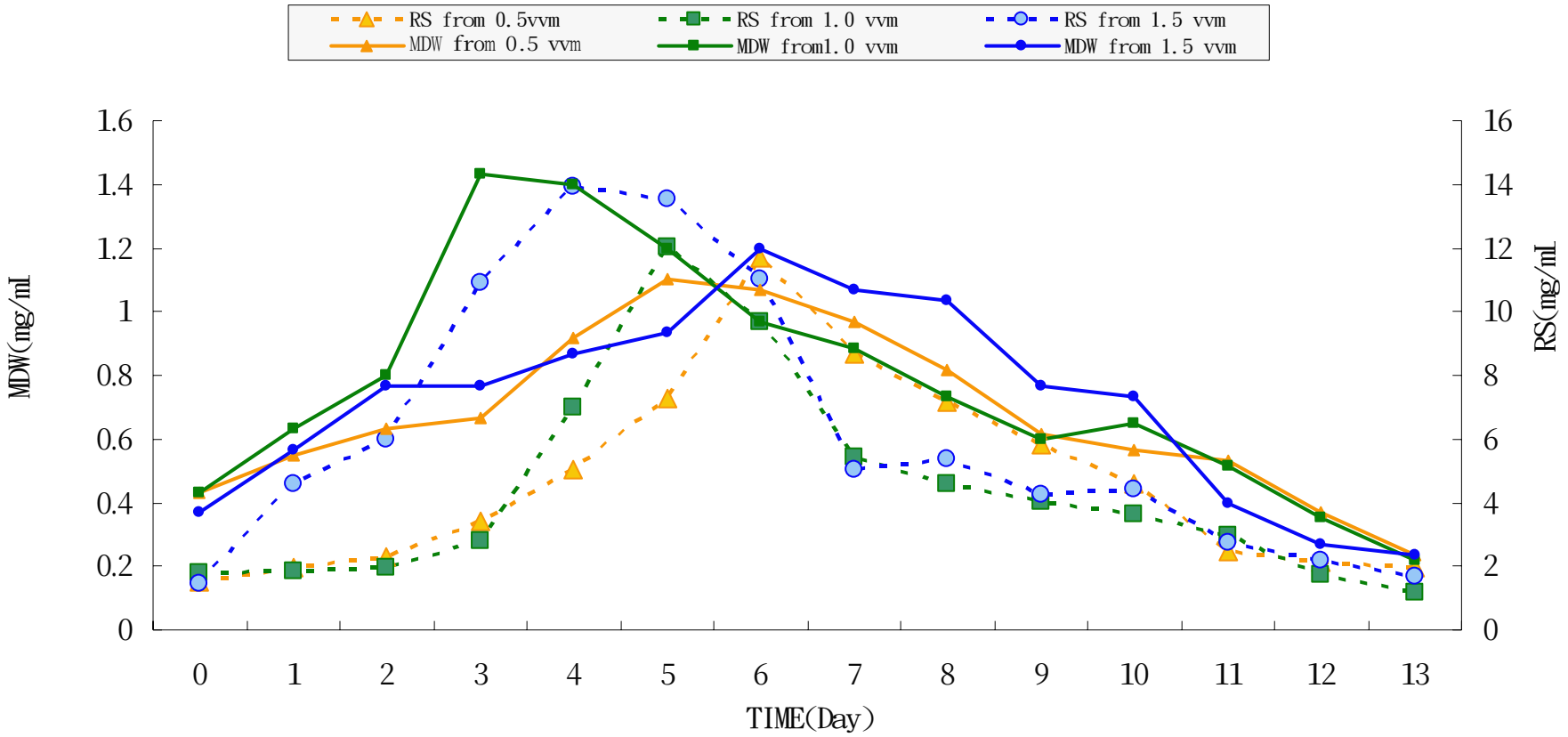
圖二十五　不同初始pH值對舞菇在發酵期間多醣體含量的影響

Fig.25 Effect of different initial pH on the polysaccharide content during the fermentation of *G. frondosa*.((a)EPS:Exo-polysaccharide;(b)IPS:Intra-polysaccharide)



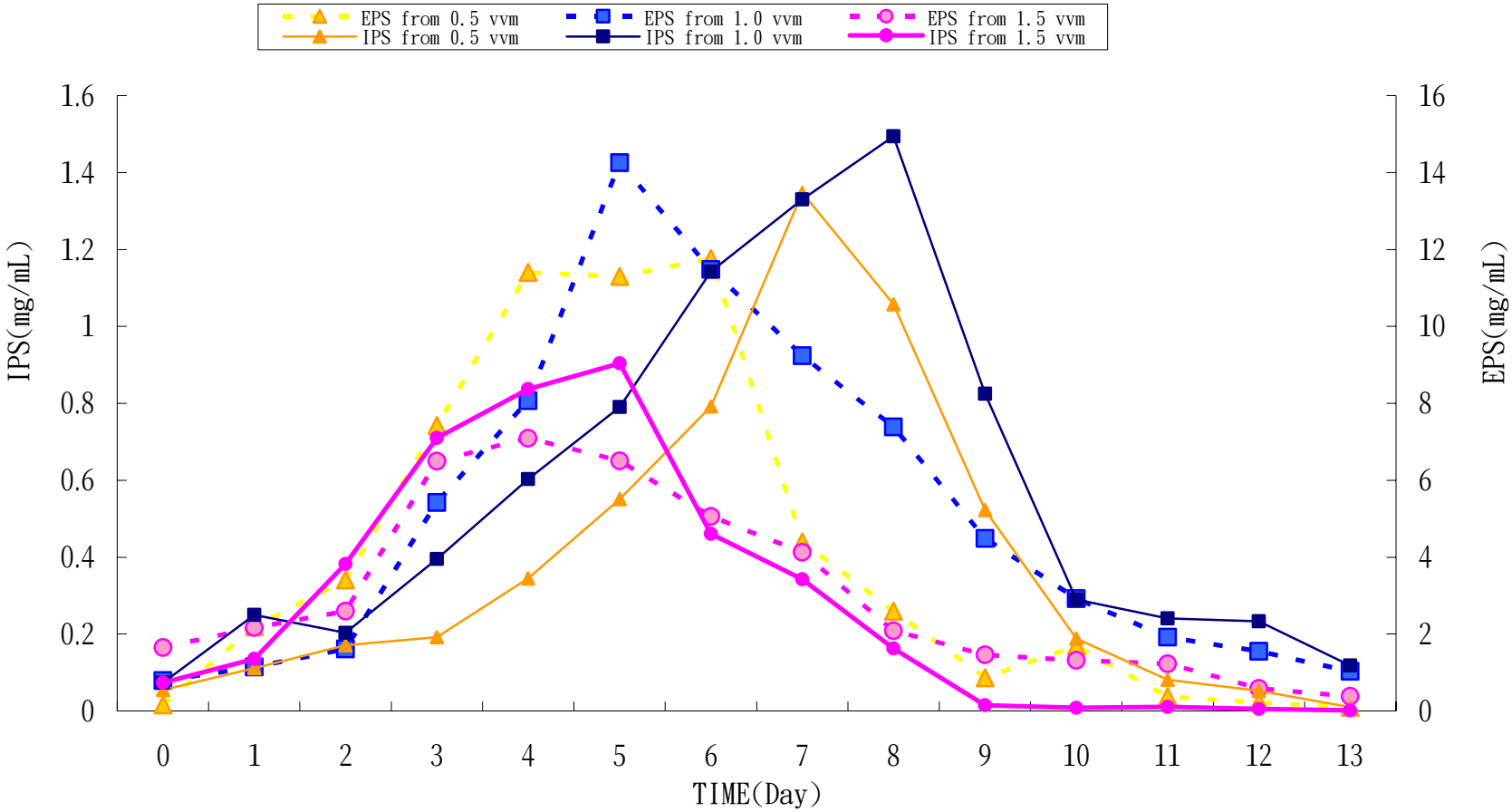
圖二十六　不同初始pH值對舞菇在發酵期間對(a)pH值及(b)黏度的變化

Fig.26 Effect of different initial pH value on the pH value and viscosity during the fermentation of *G. frondosa*.



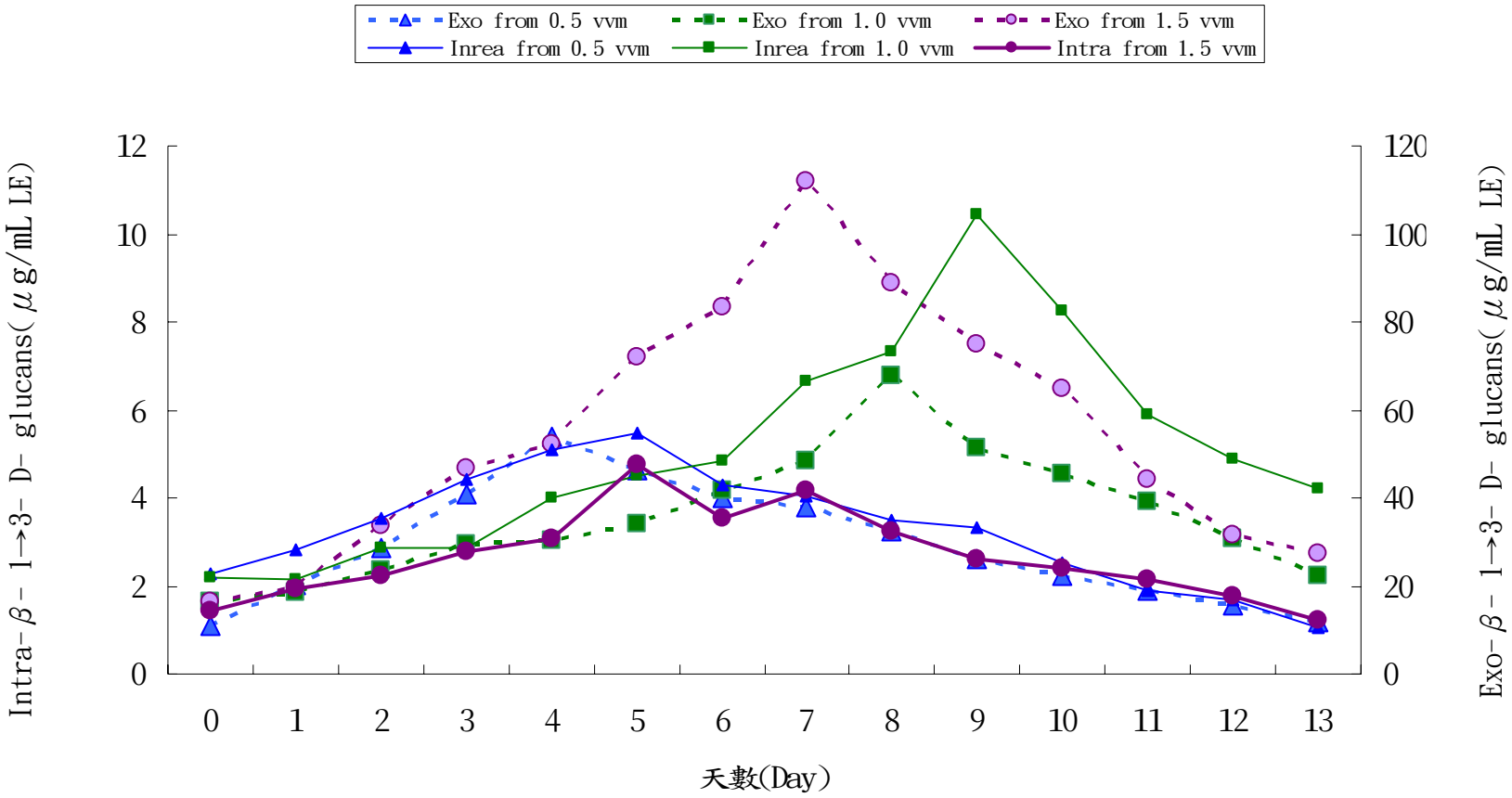
圖二十七　以不同的通氣量在攪拌式發酵槽中培養舞菇對其菌體生長及發酵液還原糖變化的影響

Fig.27 Effect of different aeration rate on mycelium dry weight(MDW) and reducing sugar(RS) content in the stirred tank fermentator of *G. frondosa*.



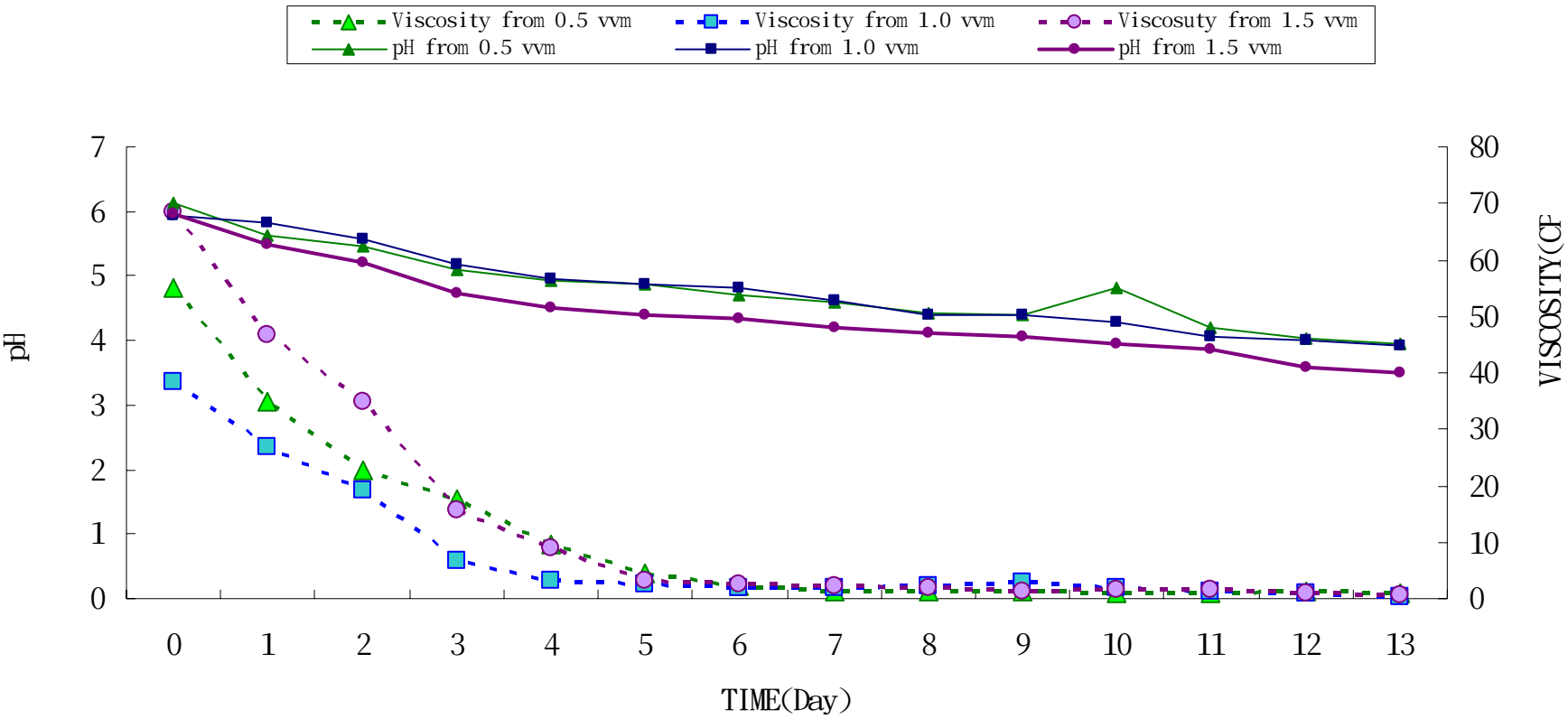
圖二十八　不同通氣量在攪拌式發酵槽培養舞菇對其多醣體含量的影響

Fig.28　Effect of different aeration rate on the polysaccharide content in the stirred tank fermentator of *G. frondosa*.(IPS:Intra-polysaccharide;EPS:Exo-polysaccharide)



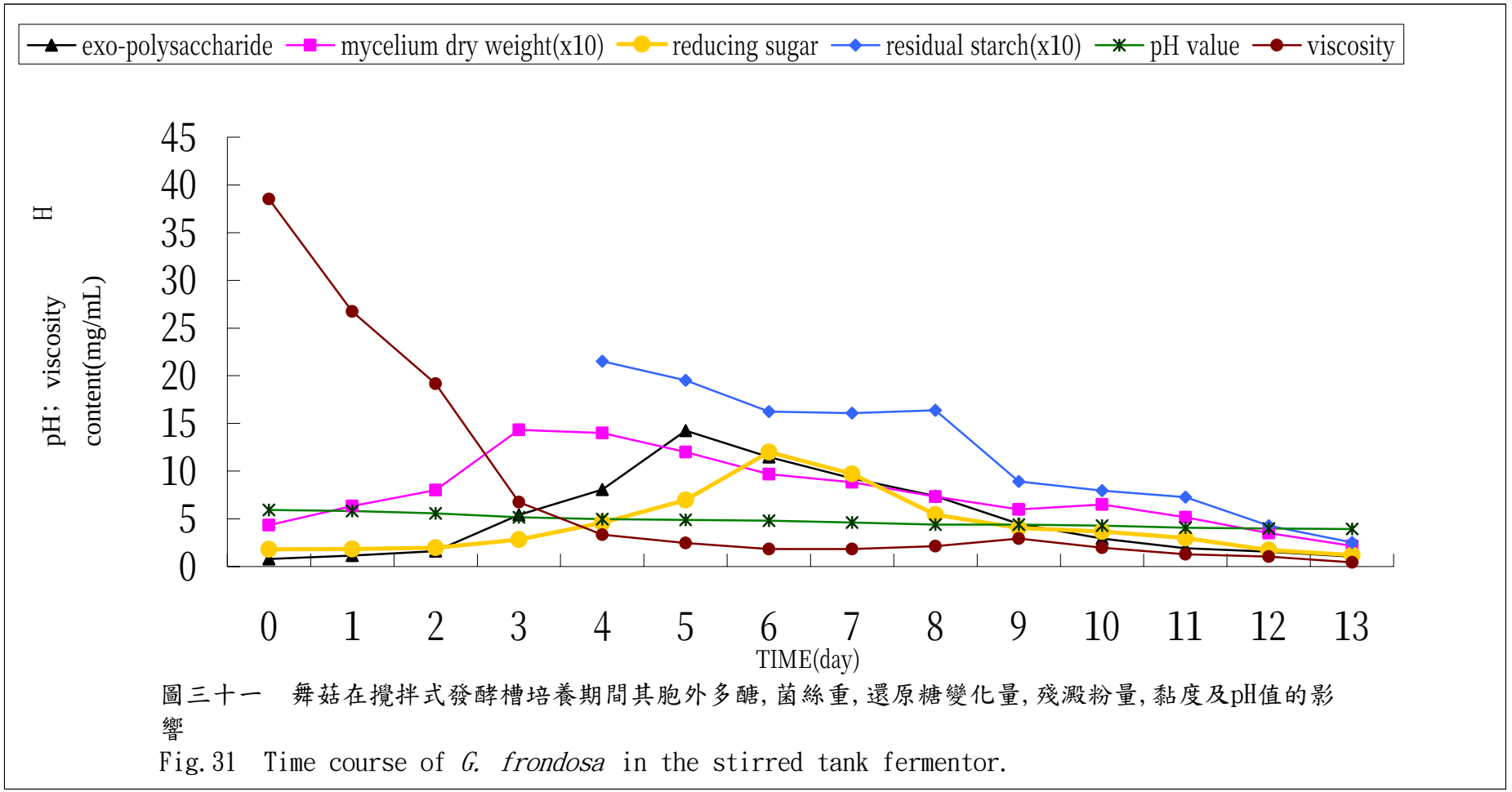
圖二十九　舞菇在攪拌式發酵槽中培養不同通氣量對其β- 1→3- D- glucans 含量的影響

Fig. 29　Effect of different aeration rate on the β- 1→3- D- glucans content in the stirred tank fermentator of *G. frondosa*.(Intra:Intra-β- 1→3- D- glucans;Exo:Exo-β- 1→3- D- glucans)



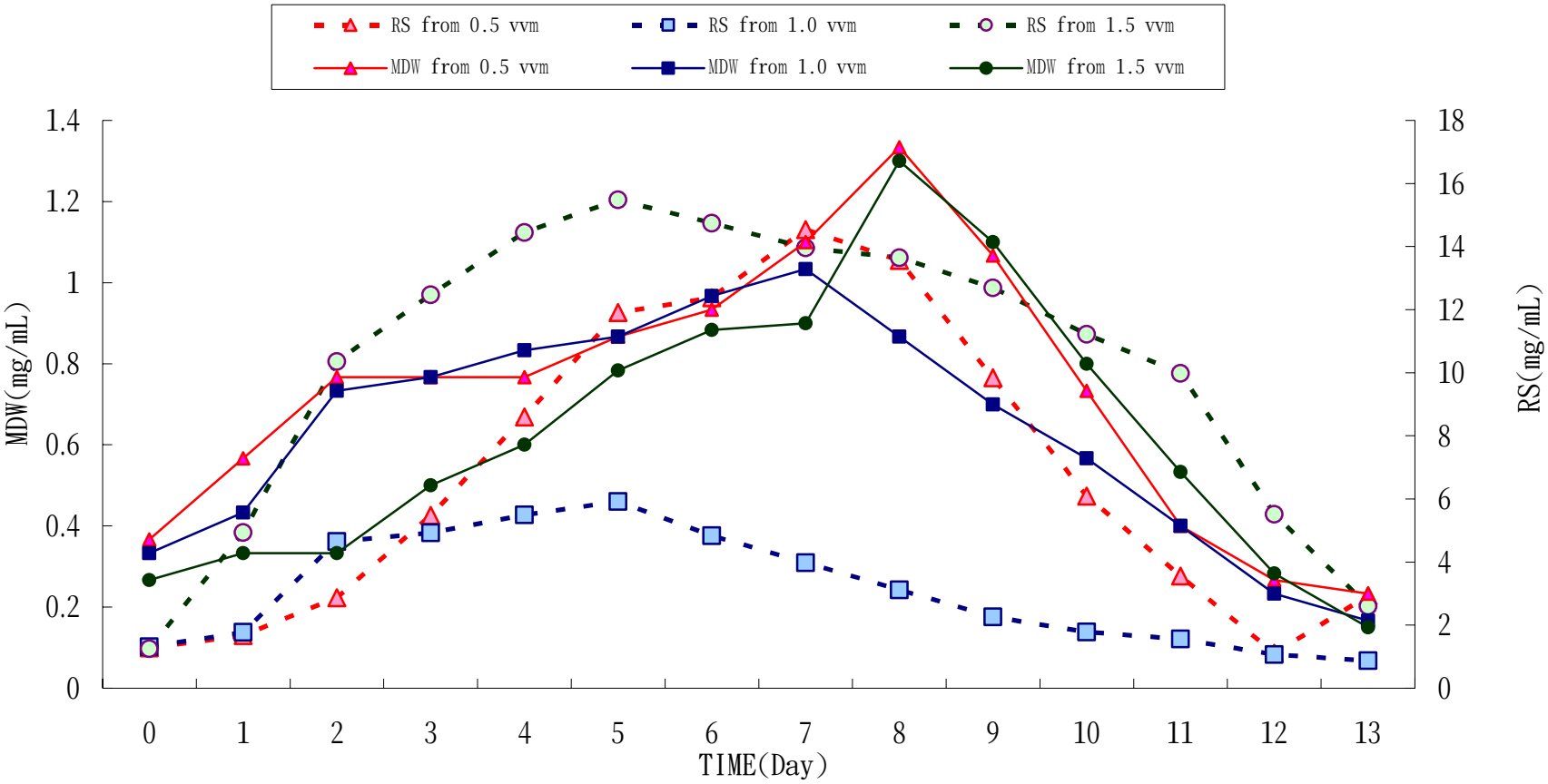
圖三十　不同通氣量在攪拌式發酵槽中培養舞菇對其pH值及黏度的影響

Fig. 30　Effect of different aeration rate on the pH value and viscosity in the stirred tank fermentator of *G. frondosa*.



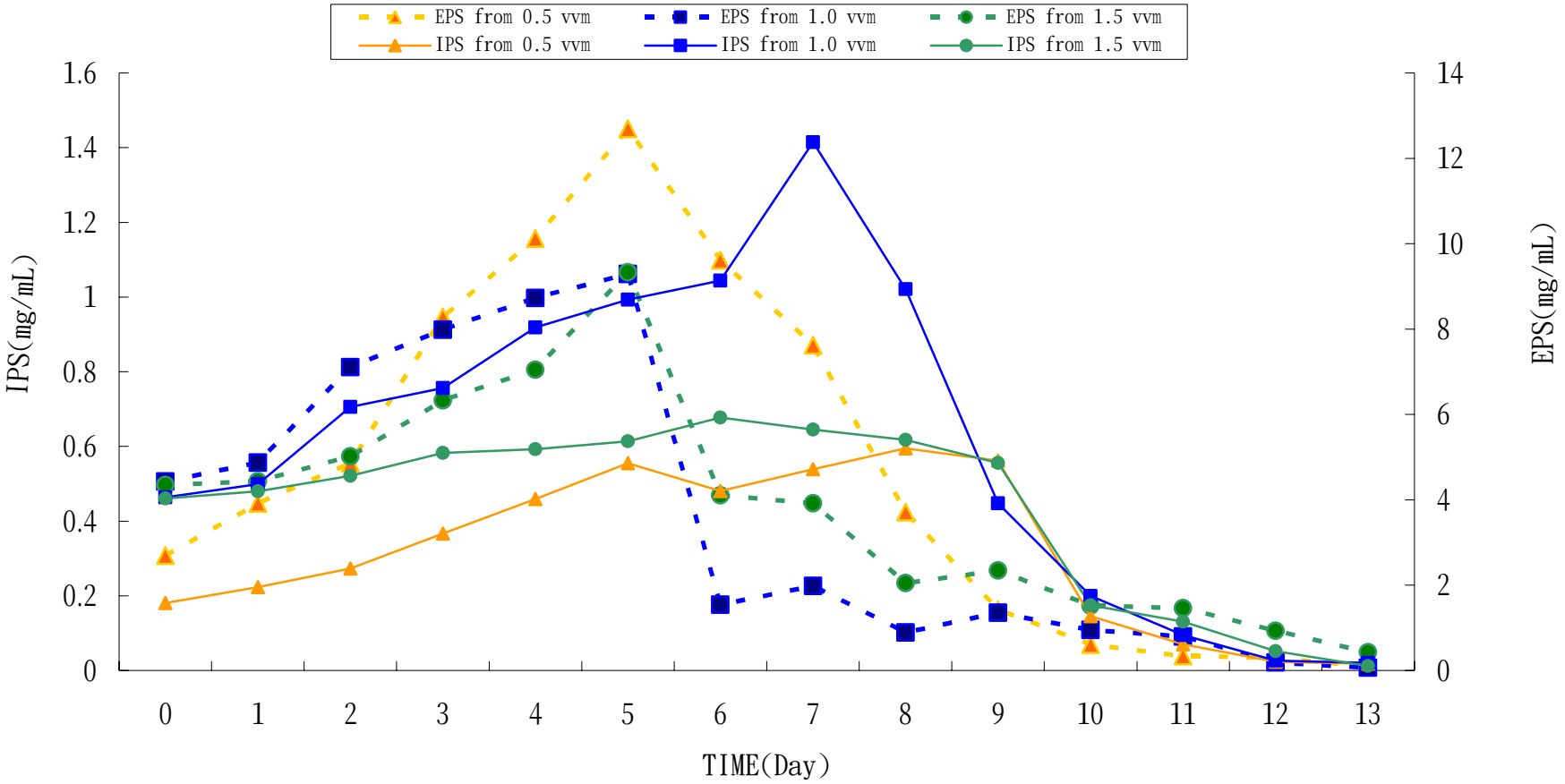
圖三十一　舞菇在攪拌式發酵槽培養期間其胞外多醣, 菌絲重, 還原糖變化量, 殘澱粉量, 黏度及pH值的影響

Fig. 31　Time course of *G. frondosa* in the stirred tank fermentor.



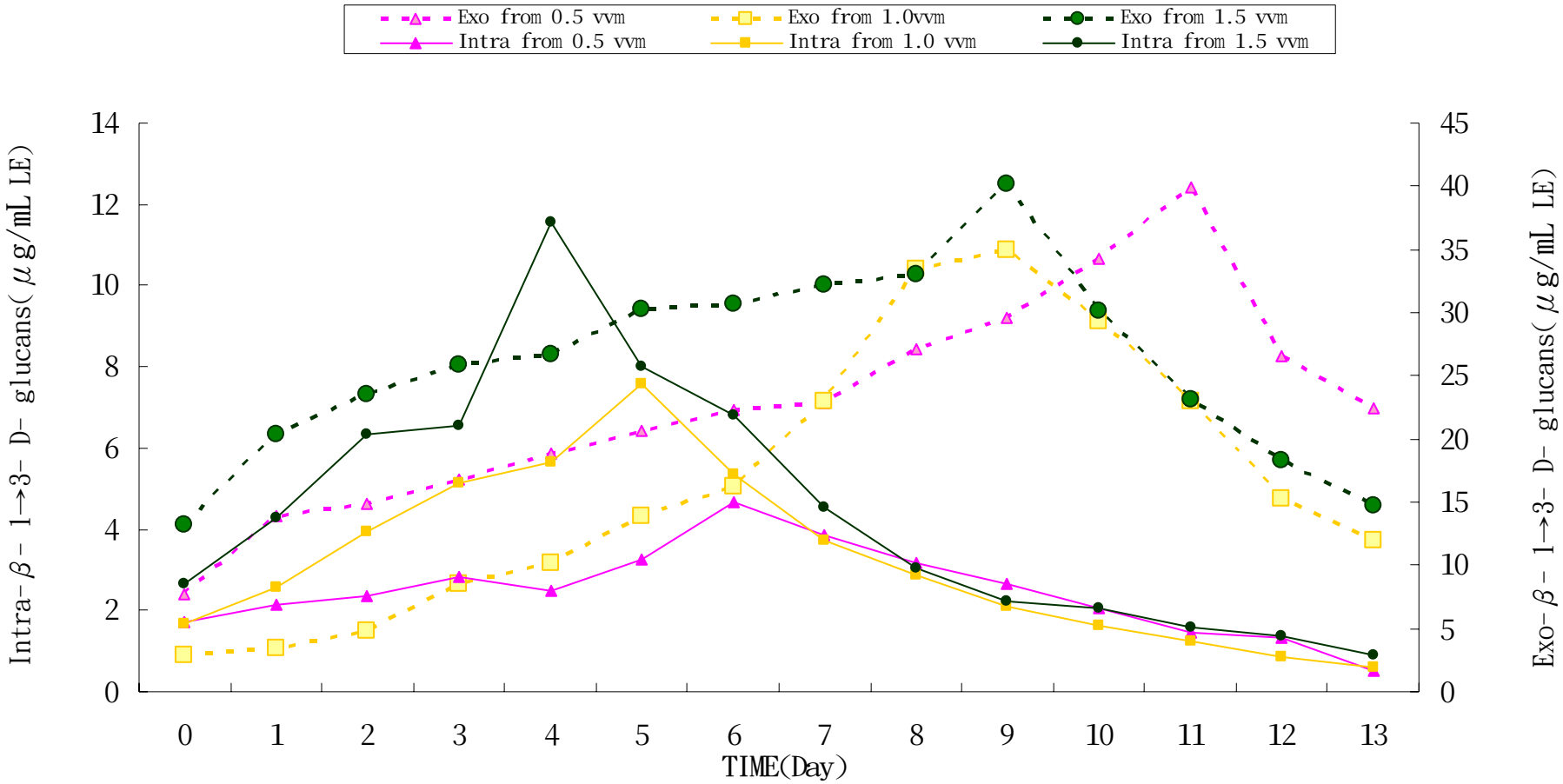
圖三十二　不同通氣量在氣舉式發酵槽中對舞菇菌體生長及發酵液還原糖的影響

Fig. 32　Effect of different aeration rate on the mycelium dry weight(MDW) and reducing sugar(RS) of *G. frondosa* in the airlift fermentator.



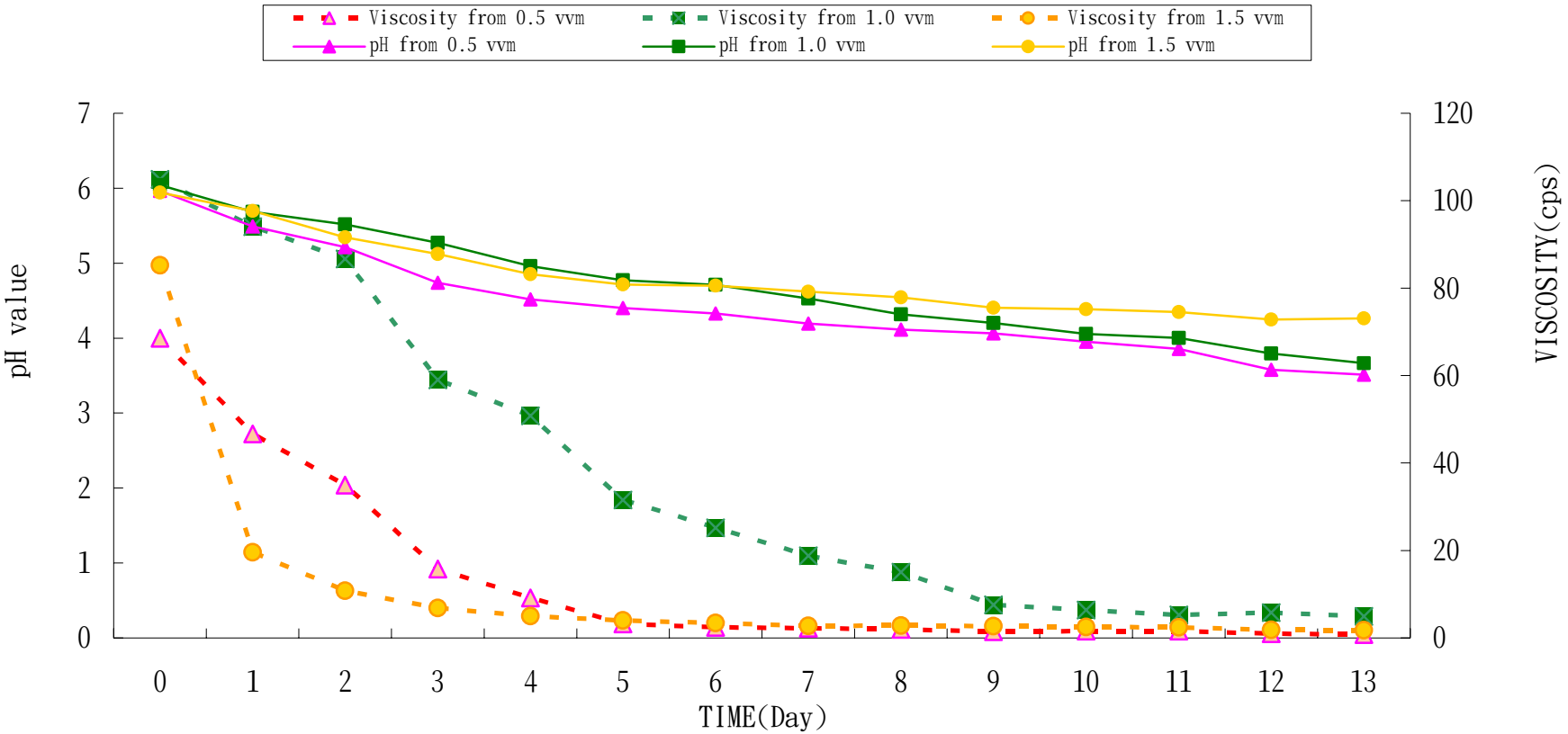
圖三十三　氣舉式發酵槽中不同通氣量對培養舞菇多醣體產量的影響

Fig.33 Effect of different aeration rate on the polysaccharide of *G. frondosa* in the airlift fermentor.(IPS:Intra-polysaccharide;EPS:Exo-polysaccharide)



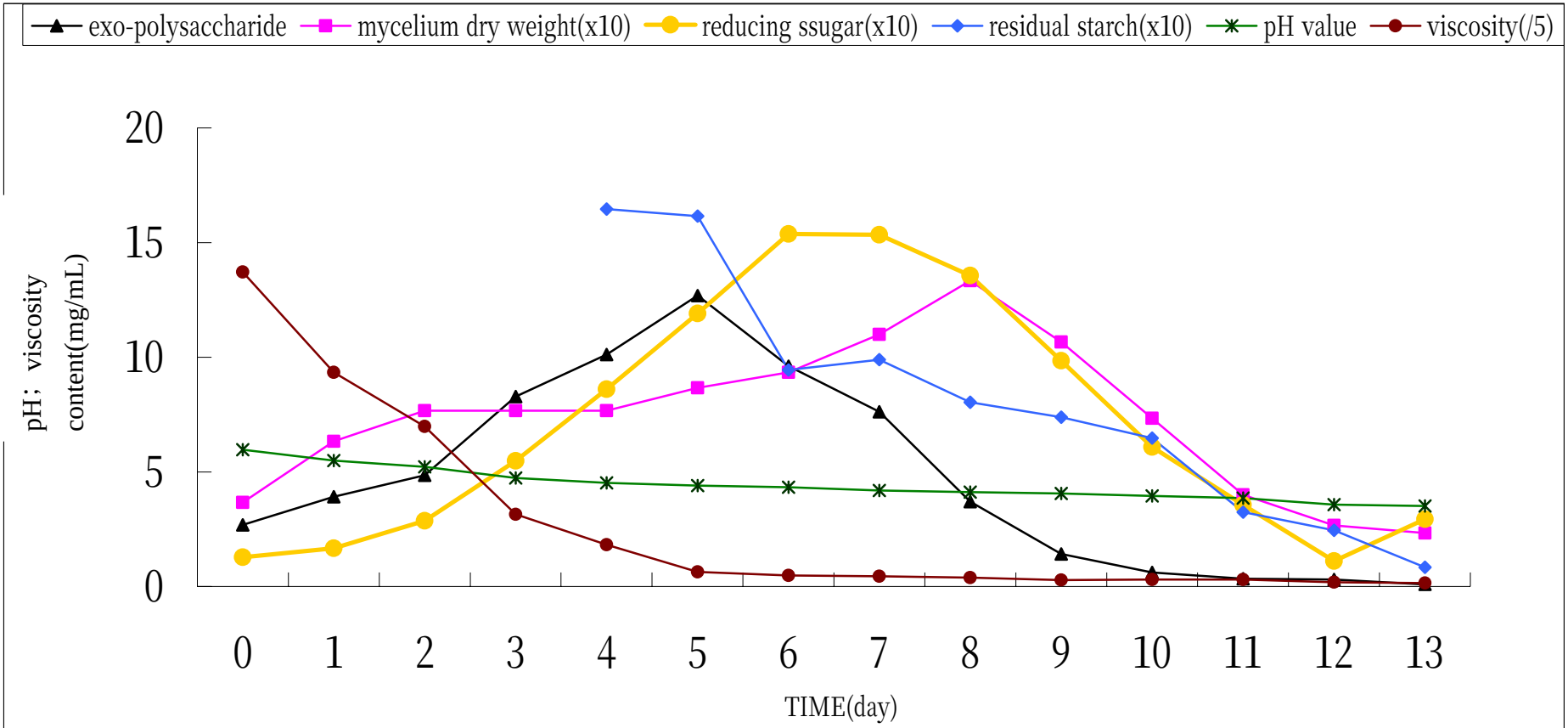
圖三十四　在氣舉式發酵槽中以不同通氣量培養舞菇對其β- 1→3- D- glucans 含量的影響

Fig. 41　Effect of different aeration rate on the β- 1→3- D- glucans content of *G. frondosa* in the airlift fermentator. (Intra: Intra-β- 1→3- D- glucans; Exo: Exo-β- 1→3- D- glucans)



圖三十五　在氣舉式發酵槽中不同通氣量對培養舞菇pH值和黏度的變化

Fig. 35　Effect of different areation rate on the pH value and viscosity of *G. frondosa* in the airlift fermentator.



圖三十六　舞菇在氣舉式發酵槽培養期間其胞外多醣, 菌絲重, 還原糖變化量, 殘澱粉量, 黏度及pH值的變化影響

Fig. 43　Time course of *G. frondosa* in the air-lift fermentor.