

29306- WO- PCT Sequ. Listing 18.06.2014  
SEQUENCE LISTING

<110> DSM I P Assets B. V.

<120> HNL mutants at low pH

<130> Case 29306

<160> 2

<170> Patent I n version 3.5

<210> 1

<211> 532

<212> PRT

<213> Prunus amygdalus

<400> 1

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Asn Ala Thr Asp Thr Ser Ser Glu Gly Ser Tyr Asp Tyr Ile Val Ile  
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Gly Gly Gly Thr Ser Gly Cys Pro Leu Ala Ala Thr Leu Ser Glu Lys  
35 40 45

Tyr Lys Val Leu Leu Leu Glu Arg Gly Thr Ile Ala Thr Glu Tyr Pro  
50 55 60

Asn Thr Leu Thr Ala Asp Gly Phe Ala Tyr Asn Leu Gln Gln Gln Asp  
65 70 75 80

Asp Gly Lys Thr Pro Val Glu Arg Phe Val Ser Glu Asp Gly Ile Asp  
85 90 95

Asn Val Arg Ala Arg Ile Leu Gly Gly Thr Thr Ile Ile Asn Ala Gly  
100 105 110

Val Tyr Ala Arg Ala Asn Ile Ser Phe Tyr Ser Gln Thr Gly Ile Glu  
115 120 125

Trp Asp Leu Asp Leu Val Asn Lys Thr Tyr Glu Trp Val Glu Asp Ala  
130 135 140

Ile Val Val Lys Pro Asn Asn Gln Ser Trp Gln Ser Val Ile Gly Glu  
145 150 155 160

Gly Phe Leu Glu Ala Gly Ile Leu Pro Asp Asn Gly Phe Ser Leu Asp  
165 170 175

His Glu Ala Gly Thr Arg Leu Thr Gly Ser Thr Phe Asp Asn Asn Gly  
180 185 190

Thr Arg His Ala Ala Asp Glu Leu Leu Asn Lys Gly Asp Pro Asn Asn  
195 200 205

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Leu 210	Leu	Val	Ala	Val	Gln	Ala 215	Ser	Val	Glu	Lys	Ile 220	Leu	Phe	Ser	Ser
Asn 225	Thr	Ser	Asn	Leu	Ser 230	Ala	Ile	Gly	Val	Ile 235	Tyr	Thr	Asp	Ser	Asp 240
Gly	Asn	Ser	His	Gln 245	Ala	Phe	Val	Arg	Gly 250	Asn	Gly	Glu	Val	Ile 255	Val
Ser	Ala	Gly	Thr 260	Ile	Gly	Thr	Pro	Gln 265	Leu	Leu	Leu	Leu	Ser 270	Gly	Val
Gly	Pro	Glu 275	Ser	Tyr	Leu	Ser	Ser 280	Leu	Asn	Ile	Thr	Val 285	Val	Gln	Pro
Asn 290	Pro	Tyr	Val	Gly	Gln	Phe 295	Val	Tyr	Asp	Asn	Pro 300	Arg	Asn	Phe	Ile
Asn 305	Ile	Leu	Pro	Pro	Asn 310	Pro	Ile	Glu	Ala	Ser 315	Val	Val	Thr	Val	Leu 320
Gly	Ile	Arg	Ser	Asp 325	Tyr	Tyr	Gln	Val	Ser 330	Leu	Ser	Ser	Leu	Pro 335	Phe
Ser	Thr	Pro	Pro 340	Phe	Ser	Leu	Phe	Pro 345	Thr	Thr	Ser	Tyr	Pro 350	Leu	Pro
Asn	Ser	Thr 355	Phe	Ala	His	Ile	Val 360	Ser	Gln	Val	Pro	Gly 365	Pro	Leu	Ser
His 370	Gly	Ser	Val	Thr	Leu	Asn 375	Ser	Ser	Ser	Asp	Val 380	Arg	Ile	Ala	Pro
Asn 385	Ile	Lys	Phe	Asn	Tyr 390	Tyr	Ser	Asn	Ser	Thr 395	Asp	Leu	Ala	Asn	Cys 400
Val	Ser	Gly	Met	Lys 405	Lys	Leu	Gly	Asp	Leu 410	Leu	Arg	Thr	Lys	Ala 415	Leu
Glu	Pro	Tyr	Lys 420	Ala	Arg	Asp	Val	Leu 425	Gly	Ile	Asp	Gly	Phe 430	Asn	Tyr
Leu	Gly 435	Val	Pro	Leu	Pro	Glu	Asn 440	Gln	Thr	Asp	Asp	Ala 445	Ser	Phe	Glu
Thr 450	Phe	Cys	Leu	Asp	Asn	Val 455	Ala	Ser	Tyr	Trp	His 460	Tyr	His	Gly	Gly
Ser 465	Leu	Val	Gly	Lys	Val 470	Leu	Asp	Asp	Ser	Phe 475	Arg	Val	Met	Gly	Ile 480

Lys Ala Leu Arg Val Val Asp Ala Ser Thr Phe Pro Tyr Glu Pro Asn  
485 490 495

Ser His Pro Gln Gly Phe Tyr Leu Met Leu Gly Arg Tyr Val Gly Leu  
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Gln Ile Leu Gln Glu Arg Ser Ile Arg Leu Glu Ala Ile His Asn Ile  
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Gln Glu Ser Met  
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<212> PRT  
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Leu Ala Asn Thr Ser Ala His Asp Phe Ser Tyr Leu Lys Phe Val Tyr  
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Asn Ala Thr Asp Thr Ser Ser Glu Gly Ser Tyr Asp Tyr Ile Val Ile  
20 25 30

Gly Gly Gly Thr Ser Gly Cys Pro Leu Ala Ala Thr Leu Ser Glu Lys  
35 40 45

Tyr Lys Val Leu Leu Leu Glu Arg Gly Thr Ile Ala Thr Glu Tyr Pro  
50 55 60

Asn Thr Leu Thr Ala Asp Gly Phe Ala Tyr Asn Leu Gln Gln Gln Asp  
65 70 75 80

Asp Gly Lys Thr Pro Val Glu Arg Phe Val Ser Glu Asp Gly Ile Asp  
85 90 95

Asn Val Arg Ala Arg Ile Leu Gly Gly Thr Thr Ile Ile Asn Ala Gly  
100 105 110

Val Tyr Ala Arg Ala Asn Ile Ser Phe Tyr Ser Gln Thr Gly Ile Glu  
115 120 125

Trp Asp Leu Asp Leu Val Asn Lys Thr Tyr Glu Trp Val Glu Asp Ala  
130 135 140

Ile Val Val Lys Pro Asn Asn Gln Ser Trp Gln Ser Val Ile Gly Glu  
145 150 155 160

Gly Phe Leu Glu Ala Gly Ile Leu Pro Asp Asn Gly Phe Ser Leu Asp  
165 170 175

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H i s G l u A l a G l y T h r A r g L e u T h r G l y S e r T h r P h e A s p A s n A s n G l y  
 180 185 190  
 T h r A r g H i s A l a A l a A s p G l u L e u L e u A s n L y s G l y A s p P r o A s n A s n  
 195 200 205  
 L e u L e u V a l A l a V a l G n A l a S e r V a l G l u L y s I l l e L e u P h e S e r S e r  
 210 215  
 A s n T h r S e r A s n L e u S e r A l a I l l e G l y V a l I l l e T y r T h r A s p S e r A s p  
 225 230 235 240  
 G l y A s n S e r H i s G n A l a P h e V a l A r g G l y A s n G l y G l u V a l I l l e V a l  
 245 250 255  
 S e r A l a G l y T h r I l l e G l y T h r P r o G n L e u L e u L e u L e u S e r G l y V a l  
 260 265 270  
 G l y P r o G l u S e r T y r L e u S e r S e r L e u A s n I l l e T h r V a l V a l G n P r o  
 275 280 285  
 A s n P r o T y r V a l G l y G n P h e V a l T y r A s p A s n P r o A r g A s n P h e I l l e  
 290 295 300  
 A s n I l l e L e u P r o P r o A s n P r o I l l e G l u A l a S e r V a l A l a T h r V a l L e u  
 305 310 315 320  
 G l y I l l e A r g S e r A s p T y r T y r G n V a l S e r L e u S e r S e r L e u P r o P h e  
 325 330 335  
 S e r T h r P r o P r o P h e S e r L e u P h e P r o T h r T h r S e r T y r P r o L e u P r o  
 340 345 350  
 A s n S e r T h r P h e A l a H i s I l l e V a l S e r G n V a l P r o G l y P r o L e u S e r  
 355 360 365  
 H i s G l y S e r V a l T h r L e u A s n S e r S e r S e r A s p V a l A r g I l l e A l a P r o  
 370 375 380  
 A s n I l l e L y s P h e A s n T y r T y r S e r A s n S e r T h r A s p L e u A l a A s n C y s  
 385 390 395 400  
 V a l S e r G l y M e t L y s L y s L e u G l y A s p L e u L e u A r g T h r L y s A l a L e u  
 405 410 415  
 G l u P r o T y r L y s A l a A r g A s p V a l L e u G l y I l l e A s p G l y P h e A s n T y r  
 420 425 430  
 L e u G l y V a l P r o L e u P r o G l u A s n G n T h r A s p A s p A l a S e r P h e G l u  
 435 440 445

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Thr	Phe	Cys	Leu	Asp	Asn	Val	Ala	Ser	Tyr	Trp	His	Tyr	His	Gly	Gly	
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Ser	Leu	Val	Gly	Lys	Val	Leu	Asp	Asp	Ser	Phe	Arg	Val	Met	Gly	Ile	
465					470					475					480	
Lys	Ala	Leu	Arg	Val	Val	Asp	Ala	Ser	Thr	Phe	Pro	Tyr	Glu	Pro	Ser	
				485					490					495		
Ser	His	Pro	Gln	Gly	Phe	Tyr	Leu	Met	Leu	Gly	Arg	Tyr	Val	Gly	Leu	
			500					505					510			
Gln	Ile	Leu	Gln	Glu	Arg	Ser	Ile	Arg	Leu	Glu	Ala	Ile	His	Asn	Ile	
		515					520					525				
Gln	Glu	Ser	Met													
	530															