

**Supplemental Figure 1:** Conservation of peptides in different TG pollen proteins. Panel A shows conservation of the 13 TG T-cell antigens (TGTA), while panel B shows the conservation of TG pollen proteins that were unreactive by both T-cell and B-cell responses.

**Supplemental Figure 2:** Cytokine release by T-cells after two weeks of peptide culture. Shown are the IFN- $\gamma$  and the IL-5 release by T-cells restimulated either with the peptide they were originally cultured with or restimulated with a relevant peptide pool or an irrelevant peptide pool or Timothy Grass extract. Each bar represents Average SFC  $\pm$  SEM.

**Supplemental Figure 3:** Separate analysis of correlation between cross-reactivity and conservation for IUIS allergen peptides and TGTA peptides. The analysis performed is the same as in Figure 3, but splits out peptides from known IUIS allergens vs. TGTA proteins.

**Supplemental Figure 4:** A) Additional T-cell clones generated from the same culture (with Phl p peptide P5) as shown in Figure 4. B) Elispot data from the cell line (top) and proliferation from individual T-cell clones (bottom) derived from another culture with Phlp peptide P7.

Patient ID	Gender	Age	Grasses				Trees				Weeds		Used in Study	Season	
			Phl p	Cyn d	Poa p	Lol p	Ant o	Fra e	Bet v	Que a	Ole e	Pla l			Amp p
D00004	female	25	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	NO	iUIS	IN
D00008	male	28	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	YES	iUIS	IN
D00010	male	50	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	iUIS	IN
D00012	female	45	YES	YES	YES	YES	YES	NO	NO	NO	YES	NO	NO	iUIS	IN
D00015	female	40	YES	YES	YES	YES	NO	YES	YES	NO	NO	NO	YES	iUIS	IN
D00016	male	54	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	ATGA	IN
D00017	female	62	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	ATGA	IN
D00020	female	40	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	iUIS	IN
D00039	male	31	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	YES	iUIS	OUT
D00041	female	26	YES	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	iUIS	OUT
D00042	male	42	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	iUIS	OUT
D00045	female	21	YES	NO	NO	YES	YES	NO	NO	NO	NO	NO	YES	iUIS	OUT
D00053	female	50	YES	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	iUIS	OUT
D00056	male	42	YES	NO	YES	NO	YES	NO	NO	NO	NO	NO	NO	iUIS	OUT
D00061	female	52	YES	NO	YES	YES	YES	YES	NO	NO	NO	NO	NO	iUIS	OUT
D00062	male	27	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	iUIS	OUT
D00073	female	44	YES	NO	YES	NO	YES	NO	YES	NO	NO	YES	NO	ATGA	OUT
D00078	male	54	YES	YES	YES	YES	YES	YES	NO	YES	NO	NO	NO	CR	OUT
D00084	male	30	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	ATGA, CR	OUT
D00089	female	62	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	CR	OUT
D00090	male	42	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	ATGA	OUT
D00092	female	39	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	ATGA	OUT
D00102	male	28	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	YES	ATGA	IN
D00104	male	61	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	YES	ATGA, CR	IN
D00117	female	53	YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	ATGA	OUT
U00001	female	20	YES	YES	YES	YES	YES	NO	NO	YES	YES	NO	YES	iUIS	OUT
U00013	female	22	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	iUIS	OUT
U00016	female	34	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	iUIS	OUT
U00022	female	29	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	YES	iUIS	OUT
U00029	female	22	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	iUIS	OUT
U00032	female	21	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	iUIS	OUT
U00039	male	29	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	iUIS	OUT
U00043	male	33	YES	YES	YES	YES	YES	YES	NO	YES	NO	NO	NO	iUIS	OUT
U00057	male	56	YES	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	iUIS	OUT
U00058	female	22	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	iUIS, ATGA, CR	OUT
U00062	female	22	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	iUIS	OUT
U00095	male	52	YES	NO	YES	YES	YES	NO	NO	NO	NO	NO	YES	ATGA	OUT
U00098	male	22	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	ATGA, CR	OUT
U00106	male	19	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	ATGA, CR	OUT
U00125	male	23	YES	NO	YES	YES	YES	YES	NO	YES	YES	YES	YES	ATGA	OUT
U00129	male	22	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	ATGA	IN
U00140	male	29	YES	NO	YES	YES	YES	NO	NO	NO	NO	YES	NO	ATGA	OUT
U00147	male	23	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	ATGA, CR	OUT
U00150	female	19	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	ATGA, CR	OUT
U00151	male	23	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	ATGA, CR	OUT
U00153	female	21	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	ATGA	IN
1140	male	21	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	CR	OUT
1249	male	45	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	CR	OUT
1250	female	47	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	CR	OUT
1370	male	35	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	CR	OUT
1372	female	43	YES	N/A	N/A	N/A	N/A	N/A	NO	N/A	N/A	N/A	N/A	CR	OUT
1373	female	37	YES	N/A	N/A	N/A	N/A	N/A	NO	N/A	N/A	N/A	N/A	CR	OUT
1376	female	37	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	CR	OUT
1378	male	51	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	CR	OUT
1379	female	51	YES	N/A	N/A	N/A	N/A	N/A	NO	N/A	N/A	N/A	N/A	CR	OUT
Summary	28 female/ 27 male	19-62	55/55	33/46	42/46	42/46	38/46	21/46	24/55	20/46	19/46	21/46	27/46		16 IN/39 OUT

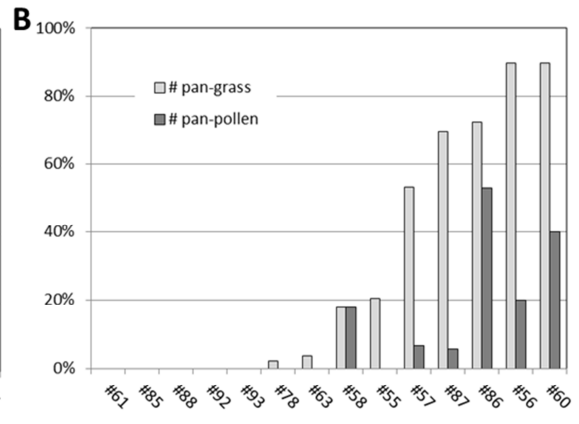
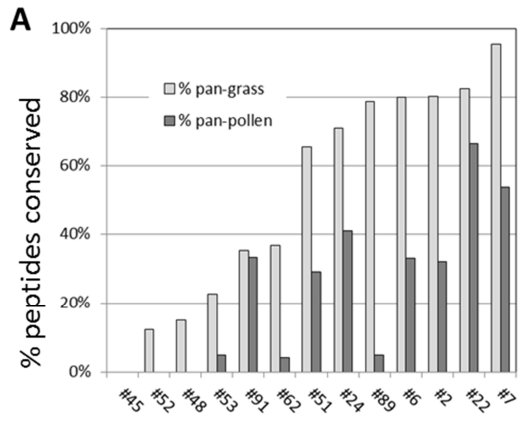
**Supplementary Table 1:** Donor Information- YES: The patient had a positive skin prick test or a RAST with specific IgE  $\geq 0.35$  kU/L in response to the allergen tested, NO: The patient had a negative skin prick test or RAST with specific IgE  $< 0.35$  kU/L in response to the allergen tested. N/A: The skin prick test or RAST data is not available for this allergen in this patient.

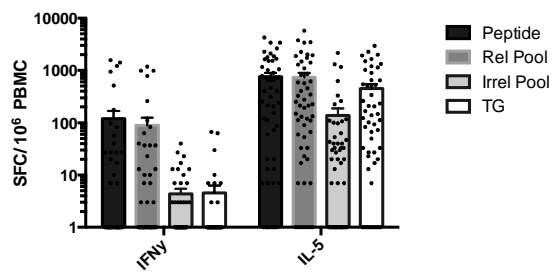
	Sweet				Rye		English	Kentucky	
<b>common name</b>	<b>vernal grass</b>	<b>Western ragweed</b>	<b>Bermuda grass</b>	<b>Ash</b>	<b>grass</b>	<b>Olive</b>	<b>plantain</b>	<b>blue grass</b>	<b>Oak</b>
<b>abbreviation</b>	AO	AP	CD	FE	LP	OE	PL	PP	QA
<b>reads (millions)</b>	75.4	62.7	66.3	75.6	65.1	73.5	59.0	67.2	63.5
<b>bases (MB)</b>	7,535	6,271	6,625	7,559	6,511	7,353	5,898	6,717	6,354
<b>assembled scaffolds</b>	317,874	121,659	112,527	81,401	122,266	74,333	57,102	128,174	54,280
<b>median scaffold length</b>	544	390	842	722	631	710	696	635	634
<b>max scaffold length</b>	11,515	8,325	14,364	9,838	9,631	8,133	8,090	10,100	14,807

**Supplemental Table 2:** Sequencing and assembly statistics

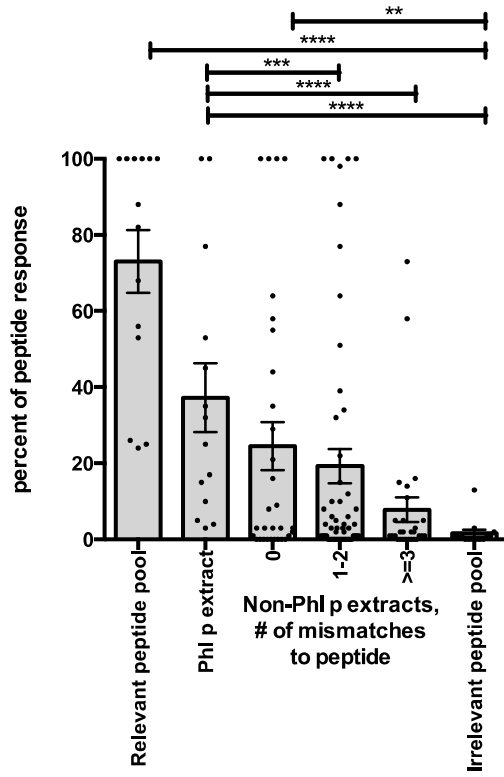
IUIS	ATGA
P1=EEWEPLTKKGNVWEV	P9=ELRKTYNLLDAVSRH
P2=NVWEVKSSKPLVGPF	P10=AVMLTFDNAGMWNVR
P3=KPPFSGMTGCGNTPI	P11=IGSFFYFPSIGMQRT
P4=STWYGKPTGAGPKDN	P12=QVYPRSWSAVMLTFD
P5=GELELQFRRVKCKYP	P13=AAYLATRGLDVVDAV
P6=SGIAFGSMAKKGDEQ	P14=NFTVGRIEEEFTAKG
P7=AFKVAATAANAAPAN	P15=APSGRIVMELYADV
P8=LAKYKANWIEIMRIK	P16=HYKGSSFHRVIPGFM
	P17=IEEEFTAKGFTVQEM
	P18=GEVLNALAYDVPIPG
	P19=NGSQFFLCTAKTAWL
	P20=VKLRRSSAAQVDGFY
	P21=VVSRLLIIPVPFDPPA
	P22=GDLYIFESRAICKYA
	P23=NPMTVFWSKMAQSMT
	P24=CDASILIDPLSNQSA
	P25=PRRWLRFCNPELSEI
	P26=QYAKEIWGITANPVP
	P27=LVSKLYEVVPGILTE

**Supplementary Table 3:** Sequences for Peptides used in Cross-Reactivity Studies

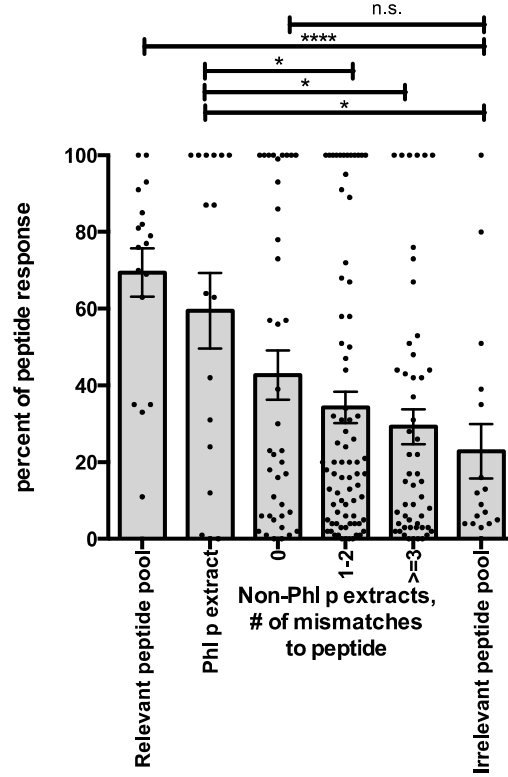




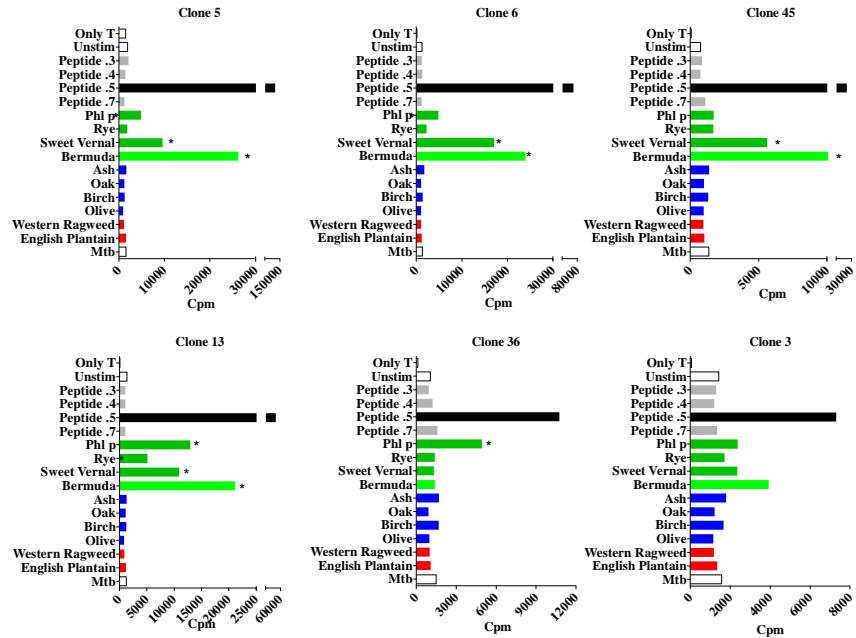
### IUIS Allergens



### NTGA Peptides



**A**



**B**

