

ULTRA BLAZER SECTION 18 EMERGENCY EXEMPTION IN MINNESOTA AND NORTH DAKOTA AND RELATED EXPERIMENTS IN 2023

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Summary

1. Glyphosate (Roundup PowerMax/Roundup PowerMax3) mixed with Ultra Blazer consistently improves waterhemp control from Ultra Blazer.
2. Roundup PowerMax3 mixed with Ultra Blazer increased necrosis and sugarbeet growth reduction injury and reduced root yield and recoverable sucrose as compared with Ultra Blazer alone.
3. Control escaped waterhemp less than 4-inches tall with Ultra Blazer at 16 fl oz/A with NIS; control 'train-wreck' situations with Roundup PowerMax3 mixed with Ultra Blazer and AMS.
4. Ninety-four percent of respondents indicated the emergency exemption was beneficial for sugarbeet producers in Minnesota and North Dakota and contributed to overall weed management in 2023.
5. Ninety-one percent of respondents indicated they would willingly support application for a 2024 emergency exemption in sugarbeet.

Introduction

The Environmental Protection Agency (EPA) approved our request for a Section 18 emergency exemption for Ultra Blazer (acifluorfen) which provided Minnesota and eastern North Dakota sugarbeet growers a postemergence herbicide to control glyphosate-resistant waterhemp in sugarbeet in 2023. Delayed melt of snow pack, especially in fields adjacent to shelter belts, pushed back sugarbeet plant. Further, rainfall to activate preemergence herbicides was variable. Finally, above normal maximum daily air temperatures combined with dry conditions caused inconsistent sugarbeet stands in both Minnesota and eastern North Dakota. The average plant date was May 13, May 6, and May 8 for American Crystal Sugar Cooperative (ACS), Minn-Dak Farmers' Cooperative (MDFC), and Southern Minnesota Beet Sugar Cooperative (SMBSC) growers, respectively. With the discontinuance of Betamix, there are currently no registered POST herbicides for effective waterhemp control that escapes soil-residual herbicide treatments.

The exemption allowed a single Ultra Blazer application at 16 fluid ounces (fl oz) per acre per year. A Section 18 exemption under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) authorizes EPA to allow an unregistered use of a pesticide for a limited time if EPA determines that an emergency condition exists. This paper summarizes the Ultra Blazer Section 18 emergency exemption including application parameters and results of a survey completed by agriculturalists and/or sugarbeet growers who applied Ultra Blazer. This report contains three 2022 program objectives: a) summarize results and user experiences from the 2023 Section 18 emergency exemption for use of Ultra Blazer in sugarbeet; b) summarize the crop tolerance yield experiment conducted at multiple locations; and c) summarize waterhemp control at multiple locations.

Materials and Methods

Section 18 Emergency Exemption

Ultra Blazer was applied at 16 fl oz/A with non-ionic surfactant (NIS) or mixed with glyphosate and ammonium sulfate (AMS). One Ultra Blazer application was made per season using ground application equipment at 20 to 30 gpa water carrier targeting waterhemp less than 4-inches tall and sugarbeet greater than the 6-lf stage. Pre-harvest interval (PHI) was 45 days and Ultra Blazer was applied from May 22 through July 28, 2022.

Application of Ultra Blazer was targeted to air temperatures less than 85F to reduce injury in sugarbeet. Likewise, producers were informed that sugarbeet injury may be greater following sudden changes from a cool, cloudy environment to a hot, sunny environment. On days when air temperature was greater than 85F, we recommended delaying application until late afternoon or early evening or when air temperatures began to decrease.

Producers and agriculturalists at Southern Minnesota Beet Sugar Coop, Minn-Dak Farmers Coop, and American Crystal Sugar Coop were surveyed by electronic mail to learn about producer experiences with Ultra Blazer (Appendix).

Ultra Blazer Tolerance Yield and Waterhemp Control Experiments.

Sugarbeet tolerance experiments were conducted near Crookston, Hendrum, Kent, Lake Lillian, and Murdock, MN in 2023. Waterhemp efficacy experiments were conducted near Moorhead and Blomkest, MN. The experimental area was prepared for planting by applying the appropriate fertilizer and tillage. Sugarbeet was seeded in 22-inch rows at about 62,000 seeds per acre with 4.6 inch spacing between seeds. We had started the Moorhead experiment in a sugarbeet area; however, due to challenges with waterhemp emergence and sugarbeet size, we moved the Moorhead experiment into a bulk fill soybean area to be consistent with waterhemp size at application.

Treatments shown in Table 1 were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO₂ at 35 psi to the center four rows of six row plots 40 feet in length. Environmental conditions at application are in Table 2 and 3.

Table 1. Herbicide treatment, herbicide rate, and application timing across locations in 2023.

Herbicide Treatment	Rate (fl oz/A)	Application timing (SGBT leaf stage)
Ultra Blazer + Prefer 90 NIS	16 + 0.25%	6-8 lf
Ultra Blazer + Prefer 90 NIS / Ultra Blazer + Prefer 90 NIS	12 + 0.125% / 12 + 0.125 %	6-8 lf / A + 3-days
Ultra Blazer + Crop Oil Concentrate	16 + 1.25%	6-8 lf
Roundup PowerMax3 + Ultra Blazer + Amsol Liquid AMS	25 + 16 + 2.5% v/v	6-8 lf
Roundup PowerMax3 + Ultra Blazer + Warrant + Amsol Liquid AMS	25 + 16 + 40 + 2.5% v/v	6-8 lf
Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS / Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS	25 + 0.25% + 2.5% v/v / 25 + 0.25% + 2.5% v/v	2 lf / 6 lf

Table 2. Application information for tolerance experiments.

	Crookston	Hendrum	Kent	Murdock	Lake Lillian
Plant Date	May 5	May 16	May 17	May 9	May 4
Application Date	June 8	June 15	June 21	June 9	June 6
Time of Day	10:30 AM	10:00 AM	6:00 PM	12:30 PM	8:00 AM
Air Temperature (F)	72	73	86	73	61
Relative Humidity (%)	56	62	43	57	83
Wind Velocity (mph)	8	3	8	7	6
Wind Direction	SSE	NE	NW	SW	E
Soil Temp. (F at 6")	70	66	-	-	-
Soil Moisture	Good	Fair	-	-	-
Cloud Cover (%)	50	100	-	-	-

Table 3. Application information for efficacy experiments.

	Moorhead	Blomkest
Plant Date	May 24	May 22
Application Date	July 5	June 23
Time of Day	7:00 AM	7:00 AM
Air Temperature (F)	67	66
Relative Humidity (%)	43	94
Wind Velocity (mph)	2	2
Wind Direction	-	-
Soil Temp. (F at 6")	70	70
Soil Moisture	Good	-
Cloud Cover (%)	90	20

Visible sugarbeet necrosis, malformation, and growth reduction were evaluated approximately 7 and 14 days after treatment (DAT) as sugarbeet injury using a 0 to 100% injury scale with 0% denoting no sugarbeet injury and 100% denoting complete loss of sugarbeet stature. Visible weed control was evaluated 7, 14, and 21 days after the 2-lf stage application using a 0 to 100 scale (0 is no control and 100 is complete control). All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared with the adjacent untreated strip.

At harvest for tolerance experiments, sugarbeet was defoliated, harvested mechanically from the center two rows of each plot, and weighed. A root sample (about 20 lbs) was collected from each plot and analyzed for sucrose content and sugar loss to molasses by American Crystal Sugar Company (East Grand Forks, MN). Experimental design was randomized complete block with six replications. Data were analyzed in this report as a RCBD with the ANOVA procedure of ARM, version 2023.3 software package.

Results

Section 18 Emergency Exemption

According to a survey of sugarbeet growers and agriculturalists, Ultra Blazer at 16 fl oz/A was applied to 19,458 sugarbeet acres in 2023 (totaling 2,432.3 gallons of Ultra Blazer). Seventy-nine percent or 16,212 acres were applied in Minnesota and 21% or 4,246 acres were applied in North Dakota (Tables 4 and 5).

Table 4. Sugarbeet acres sprayed with Ultra Blazer and Ultra Blazer product usage by state.

State	Acres treated	Ultra Blazer	Acifluorfen
		---gallon---	---pound---
Minnesota	16,212	2,026.5	4,053
North Dakota	4,246	530.8	1,061.6
Total	20,458	2,557.3	5,114.6

Table 5. Sugarbeet acres sprayed with Ultra Blazer and Ultra Blazer product usage by cooperative.

Cooperative	Acres treated	Ultra Blazer	Acifluorfen
		---gallon---	---pound---
ACSC	4,732	591.5	1183
MDFC	9,750	1,18.8	2437.5
SMBSC	5,976	747	1494
Total	20,458	2557.3	5,114.5

Three observations stand out from overseeing the emergency exemption and summarizing observations and agriculturalist/producer critiques. First, our producers understand Ultra Blazer is a tool we would prefer not to use. Many agriculturalists stated Ultra Blazer does not fix our problem; however, it is a necessary tool in emergency situations. Second, Ultra Blazer consistently causes sugarbeet injury and only provides 65% to 80% control (Figure 2). Waterhemp control is strongly influenced by environmental conditions at application and by spray quality or the selection of spray nozzles and carrier volume. Finally, Roundup PowerMax3 mixed with Ultra Blazer caused more sugarbeet injury than with Roundup PowerMax. The restriction of applying Ultra Blazer with Roundup PowerMax3 likely limited the number of growers who utilized this escaped weed control method.

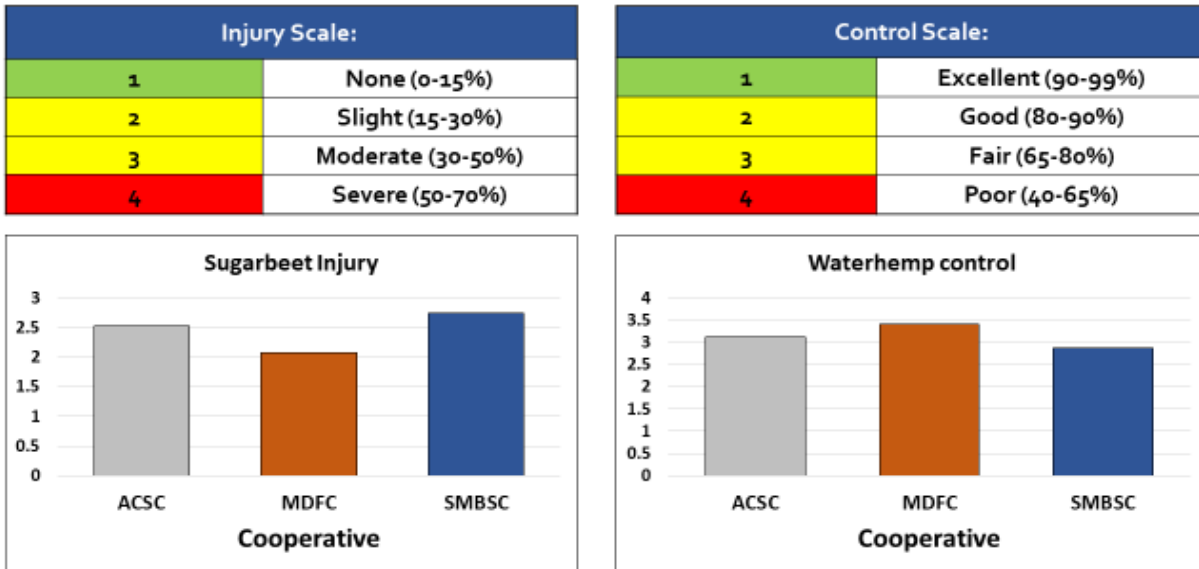


Figure 2. Producer and Agriculturalist survey of sugarbeet injury and waterhemp control from Ultra Blazer Section 18 EE, Minnesota and North Dakota, 2023.

Producers and agriculturalists surveyed reported the Section 18 EE was beneficial for sugarbeet growers and have encouraged Extension Sugarbeet to file for a Section 18 EE in 2024 and to urge UPL NA Inc. to continue towards Section 3 approval for Ultra Blazer in sugarbeet.

Ultra Blazer Tolerance Yield and Waterhemp Control Experiments

Tolerance Yield Experiment. Sugarbeet necrosis injury was evaluated as the percent of sugarbeet leaf area that was bronzed from Ultra Blazer application. All Ultra Blazer treatments caused necrosis injury; however, necrosis injury was greatest from Ultra Blazer at 16 fl oz/A plus crop oil concentrate (COC) at 1.25% v/v and was consistent across locations (Table 6). Similarly, an application of Roundup PowerMax3 mixed with Ultra Blazer plus AMS increased necrosis injury as compared with Ultra Blazer alone. Repeat Ultra Blazer applications of 12 fl oz/A followed by (fb) 12 fl oz/A gave slightly less necrosis injury than Ultra Blazer at 16 fl oz/A; however, the repeat Ultra Blazer application extended the duration of necrosis injury as compared with a single application.

Necrosis injury from Warrant mixed with Ultra Blazer, Roundup PowerMax3, and liquid AMS was less than injury from Ultra Blazer plus Roundup PowerMax3 and liquid AMS (Table 4). Sugarbeet necrosis and growth reduction injury from adding Warrant to Ultra Blazer and Roundup PowerMax3 was similar to the Ultra Blazer at 16 fl oz/A plus NIS standard treatment, across locations.

Sugarbeet growth reduction injury across treatments averaged 28%, 29%, and 21%, 3, 10, and 20 DAAC, respectively (Table 6). As with necrosis, growth reduction injury was greatest when COC or Roundup PowerMax3 with liquid AMS was mixed with Ultra Blazer. Sugarbeet growth reduction injury from Ultra Blazer at 16 fl oz/A with NIS was similar to sugarbeet injury from 2-times Roundup PowerMax3 applications with NIS and liquid AMS. Two-times Ultra Blazer application at 12 fl oz/A with NIS gave growth reduction injury similar to Ultra Blazer at 16 fl oz/A with NIS; however, injury was greater than injury from the Roundup PowerMax3 control.

Table 6. Sugarbeet visible injury from herbicide treatments, across locations, 2023.^a

Herbicide Treatment	Rate	Sugarbeet Growth Reduction			
		Necrosis ^b		Sugarbeet Growth Reduction	
		3 DAAC ^c	3 DAAC	10 DAAC	20 DAAC
	----fl oz/A-----	-----%-----			
Ultra Blazer + Prefer 90 NIS	16 + 0.25%	26 bc	25 b	22 b	13 ab
Ultra Blazer + Prefer 90 NIS /	12 + 0.125% /	21 b	22 b	33 bc	23 bc
Ultra Blazer + Prefer 90 NIS	12 + 0.125 %				
Ultra Blazer + Crop Oil Concentrate	16 + 1.25%	49 d	43 c	46 d	34 c
Roundup PowerMax3 + Ultra Blazer + Amsol Liquid AMS	25 + 16 + 2.5% v/v	48 d	44 c	43 cd	32 c
Roundup PowerMax3 + Ultra Blazer + Warrant + Amsol Liquid AMS	25 + 16 + 40 + 2.5% v/v	35 c	29 b	28 b	18 b
Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS /	25 + 0.25% + 2.5% v/v / 25 +	1 a	4 a	2 a	3 a
Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS	0.25% + 2.5% v/v				
P-Value (0.05)		<0.0001	<0.0001	<0.0001	<0.0001

^aMeans within a rating timing that do not share any letter are significantly different by the LSD at the 5% level of significance.

^bNec. = Visual necrosis.

^cDAAC = Days after application C.

Root yield, % sucrose, and recoverable sucrose from Ultra Blazer at 16 fl oz/A plus NIS were the same as two applications of glyphosate alone (Table 7). Root yield and % sucrose from two applications of Ultra Blazer at 12 fl oz/A with NIS were the same as Ultra Blazer at 16 fl oz/A. However, recoverable sucrose from two applications of Ultra Blazer applications at 12 fl oz/A was less than a single application of Ultra Blazer at 16 fl oz/A.

Warrant mixed with Ultra Blazer, Roundup PowerMax3, and liquid AMS appeared to reduce sugarbeet vegetative injury and yield components as compared with Ultra Blazer mixed with Roundup PowerMax3 and liquid AMS. This is consistent from results in Michigan (personal communication with Dr. Christy Sprague).

Table 7. Sugarbeet root yield, % sucrose, and recoverable sucrose in response to herbicide treatment across locations, 2023.^a

Herbicide Treatment	Rate	Root Yield	Sucrose	Recoverable Sucrose
	----fl oz/A-----	-Ton/A-	--%--	---lb/A---
Ultra Blazer + Prefer 90 NIS	16 + 0.25%	35.5 ab	17.7	11,180 ab
Ultra Blazer + Prefer 90 NIS / Ultra Blazer + Prefer 90 NIS	12 + 0.125% / 12 + 0.125 %	34.2 bc	17.7	10,611 c
Ultra Blazer + Crop Oil Concentrate	16 + 1.25%	33.3 c	17.7	10,417 c
Roundup PowerMax3 + Ultra Blazer + Amsol Liquid AMS	25 + 16 + 2.5% v/v	33.3 c	17.8	10,430 c
Roundup PowerMax3 + Ultra Blazer + Warrant + Amsol Liquid AMS	25 + 16 + 40 + 2.5% v/v	34.9 bc	17.5	10,737 bc
Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS / Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS	25 + 0.25% + 2.5% v/v / 25 + 0.25% + 2.5% v/v	37 a	17.8	11,639 a
P-Value (0.05)		0.001	NS	0.001

^aMeans within a rating timing that do not share any letter are significantly different by the LSD at the 5% level of significance.

Waterhemp Control. The waterhemp control experiment at Moorhead was terminated and reestablished in soybean. The efficacy experiment was in sugarbeet at Blomkest. Thus, we elected to consider each experiment singly due to the difference in crop species between the two experiments.

Waterhemp control ranged from 40 to 88% at Moorhead, MN and 68 to 93% at Blomkest, MN, 14 DAAC (Table 8). Waterhemp control was or tended to be best when Ultra Blazer was tank mixed with Roundup PowerMax3 plus AMS across locations and evaluations. These results are consistent with results from Ms. Emma Burt's Master of Science research and other results previously communicated. Ultra Blazer plus COC provided or tended to provide waterhemp control similar to Ultra Blazer mixed with Roundup PowerMax3 across locations and evaluations.

Table 8. Waterhemp control 7 and 14 days after herbicide treatments, two locations, 2023.^a

Herbicide Treatment	Rate	Waterhemp Control			
		Moorhead		Blomkest	
		7 DAAC ^b	14 DAAC	7 DAAC	14 DAAC
	----fl oz/A----	-----%-----			
Ultra Blazer + Prefer 90 NIS	16 + 0.25%	71 b	61 c	79 abc	81 abc
Ultra Blazer + Prefer 90 NIS /	12 + 0.125% /	74 b	71 c	84 ab	89 ab
Ultra Blazer + Prefer 90 NIS	12 + 0.125 %				
Ultra Blazer + Crop Oil Concentrate	16 + 1.25%	83 ab	73 bc	88 ab	81 abc
Roundup PowerMax3 + Ultra Blazer + Amsol Liquid AMS	25 + 16 + 2.5% v/v	91 a	85 ab	93 a	93 a
Roundup PowerMax3 + Ultra Blazer + Warrant + Amsol Liquid AMS	25 + 16 + 40 + 2.5% v/v	89 a	88 a	75 bc	73 bc
Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS /	25 + 0.25% + 2.5% v/v / 25 +	43 c	40 d	69 c	68 c
Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS	0.25% + 2.5% v/v				
P-Value (0.05)		<0.0001	<0.0001	0.0383	0.0472

^aMeans within a rating timing that do not share any letter are significantly different by the LSD at the 5% level of significance.

^bDAAC = Days after application C.

Two applications of Ultra Blazer at 12 fl oz/A gave better waterhemp control at Blomkest than Moorhead. Conversely, Ultra Blazer plus Roundup PowerMax3 and Warrant plus AMS gave better control at Moorhead than Blomkest. A repeat application of Ultra Blazer at 12 fl oz/A plus NIS gave waterhemp control similar to a single Ultra Blazer application at 16 fl oz/A plus NIS.

Roundup PowerMax3 provided excellent common lambsquarters control whereas Ultra Blazer provided little or no common lambsquarters control (Table 9). We did not observe any antagonism with common lambsquarters when Ultra Blazer and Warrant were tank mixed with glyphosate.

Table 9. Common lambsquarters control 7 and 14 days after herbicide treatments, Moorhead, MN, 2023. ^a

Herbicide Treatment	Rate -----fl oz/A-----	Common Lambsquarters Control	
		7 DAAC ^b	14 DAAC
		-----%-----	
Ultra Blazer + Prefer 90 NIS	16 + 0.25%	3 d	0 e
Ultra Blazer + Prefer 90 NIS / Ultra Blazer + Prefer 90 NIS	12 + 0.125% / 12 + 0.125 %	35 b	10 d
Ultra Blazer + Crop Oil Concentrate	16 + 1.25%	23 c	23 c
Roundup PowerMax3 + Ultra Blazer + Amsol Liquid AMS	25 + 16 + 2.5% v/v	99 a	94 b
Roundup PowerMax3 + Ultra Blazer + Warrant + Amsol Liquid AMS	25 + 16 + 40 + 2.5% v/v	99 a	97 ab
Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS / Roundup PowerMax3 + Prefer 90 NIS + Amsol Liquid AMS	25 + 0.25% + 2.5% v/v / 25 + 0.25% + 2.5% v/v	98 a	98 a
P-Value (0.05)		<0.0001	<0.0001

^aMeans within a rating timing that do not share any letter are significantly different by the LSD at the 5% level of significance.

^bDAAC = Days after application C.

Conclusion

Controlling weeds in sugarbeet with pesticides continues to be a compromise between sugarbeet injury and weed control. For many years, producers had the luxury of broad-spectrum and uniform weed control with glyphosate and no sugarbeet injury. Glyphosate applied over RR sugarbeet continues to be the safest active ingredient I have evaluated in sugarbeet in my 36-year career, both as a graduate student working with sugarbeet, a representative of industry, and an academic, developing weed control strategies in sugarbeet. Sugarbeet are not affected by glyphosate rate, adjuvant, growth stage, or environmental conditions.

Glyphosate resistant (GR) weeds forces producers to pursue products that cause greater sugarbeet injury in pursuit of control of escaped weeds. The Section 18 emergency exemption exemplifies the need for Ultra Blazer in sugarbeet but also reveals the crop injury potential and the possibilities for waterhemp regrowth. I support the use of Ultra Blazer for control of weed escapes in sugarbeet. However, it is clear that we need to find ways to improve sugarbeet safety and optimize waterhemp control. Finally, we need to continue to pursue other options for control of GR weeds. The 2023 (and 2022) Ultra Blazer tolerance yield experiments were designed to determine if sugarbeet injury in response to Ultra Blazer could be reduced, while maintaining or improving waterhemp control through improved water volume, spray nozzle selection, adjuvants, or herbicide mixtures. Unfortunately, there is no ‘silver bullet’ with Ultra Blazer.

Appendix. Survey
**2023 Ultra Blazer Section 18 Emergency Exemption
Field Observations**

Please answer the following questions.

1. What county was Ultra Blazer used for weed control in sugarbeet? _____

2. How many acres were sugarbeet treated with Ultra Blazer for weed control? _____

3. Record sugarbeet injury (necrosis or growth reduction) from Ultra Blazer?

None (0-15%) Slight (15-30%) Moderate (30-50%) Severe (50-70%)

4. Record weed control from Ultra Blazer in sugarbeet?

Excellent (90-99%) Good (80-90%) Fair (65-80%) Poor (40-65%)

5. Did you observe any unexpected / adverse effects from using Ultra Blazer in sugarbeet?

YES NO

6. Did you find the Section 18 to be valuable/useful?

YES NO

7. Would you like to use Ultra Blazer again in 2024?

YES NO.

Write comments to provide additional details regarding your experiences.
