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Optimize Your Experiment

Spatially Balanced Complete Block Designs

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Spatially Balanced Complete Block designs offer a simple way to reduce impacts of spatial variability on experiments without requiring complex design procedures or data analysis methods. They reduce bias and inconsistent precision in the presence of trends and spatial autocorrelation. These SBCB designs were computer generated to (1) equalize average spatial distances between treatments and (2) balance positions of each treatment in different blocks. SBCB designs are enhanced subsets of Randomized Complete Block Designs, and are therefore statistically analyzed in the same manner. They are Latin Squares when the numbers of treatments and replications are equal.

Directions: Assign treatments randomly to letter indicators for the desired number of treatments and replications. When implemented, the design is referred to as a Spatially Balanced Randomized Complete Block Design. For split-plot designs, use two-steps: Main plots are first laid out. Then for each block, split plots are defined where each main plot is assumed as a replication.

# TRTS ↓	# REPLICATIONS				
	2	3	4	5	6
2	ba ab	ab ba ba	ba ab ab ba	ab ba ab ba ab	ba ab ab ba ba ab
3	bca cab	cba bac acb	bac acb abc cab	bac acb cba bca cba	acb cba bac acb cba bac
4	dcab cbda	cdab dbca dabc	abcd cdab dabc bcda	cbda dcab acbd badc bdca	dcba bcda bdac abcd cadb dabc
5	debac bdcea	cebad eadcb dceba	edacb dbcea acdbe baedc	cdebf dabce aecdb ebdac bcaed	caedb dbaec bcdae becad aebcd edcba
6	cabfed becdaf	facedb cbadef efbacd	bcedfa cafedb efbacd fdcbae	beacdf afbdec fceabd cbdfae dacefb	feadbc baecdf edcbfa cfbead acdfeb dbface
7	gbcdeaf dagfbec	bcgadef gedcbfa caefgbd	fdcbage bgfcead afbecdg cagfdeb	cdgfeab fbdagce gabcdef deagfbc acfebdg	eafdbcg fcgaebd gbaecdf cebfdga dgecfab adcbgfe
8	cfehgdba hdfacbge	cefdbhag hfgcdaeb facbgehd	dbfhegac bcheadfg hdgcbaef egbdcfha	fhegcabd cfdegbha ebchafdg aefdbhgc hdecagfb	gbfceahd efdbhgac hgefacdb aebgdhcf gdafcebh fabhgdec
9	fbicagdeh cdbghfeai	caefdhibg ehicgfdab dicbeaghf	dgeafhibc aighcefdb ehabdigcf iecdafbgh	bacghfdei ahdceibgf ebhfagidc geadfbcih fceaihgbd	fedigbcah dabgecfhi hdcebgifa ibehafdcg bcfdiahge gfhbdiaec
10	ciadbgfhje gdhiecjafb	dgbhfjceia bcfadhiegj fidjbagech	gcbejdfaih edacighbfj bieagfjchd agjdbheicf	gcfijdhbae dfaghibjec bgjdefcaih idbcagefhj fbchdegija	chbigdfeja diabhegjfc ijhedfcagb egicahdfbj gdjhcaebif hafgijbcde
11	bcijakgehdf kjhcgfbdiea	acjgiehkbfd bghafjdicek ifgkcbadehj	eikfacdgjbh fdihjabkgec jkfcdbehiag dakhejgfcib	jfkdagcheib abckfhejigd gahjbefdcki ekgbjcdaihf cjeaifgbkdh	fibacekdhjg ahikdjbcgfe dbeighajfkc ijcehdfbagk eajdfkigbch dcagifhekbj
12	fjcahlgibked liakjdfecbhg	cjeglhikabfd gkfhecdbijla hblcfgajdkei	ekgiajbdflhc jidcklgbfaeh laibdhekcgjf dgaceljhifkb	dfgichebakjl ailfhedjkgcb fkhgabldecij hcadjfblgike bdihklcfjaeg	iadkhgfcbjel bkijgcaehldf gfkejadilbhc hjafbkldgcie aglbifehkdcj dbghejifcalk

Source: H. van Es, C. Gomes, M. Sellmann, C. van Es. 2007. Spatially-Balanced CompleteBlock Designs for Field Experiments. Geoderma 140:346-352.